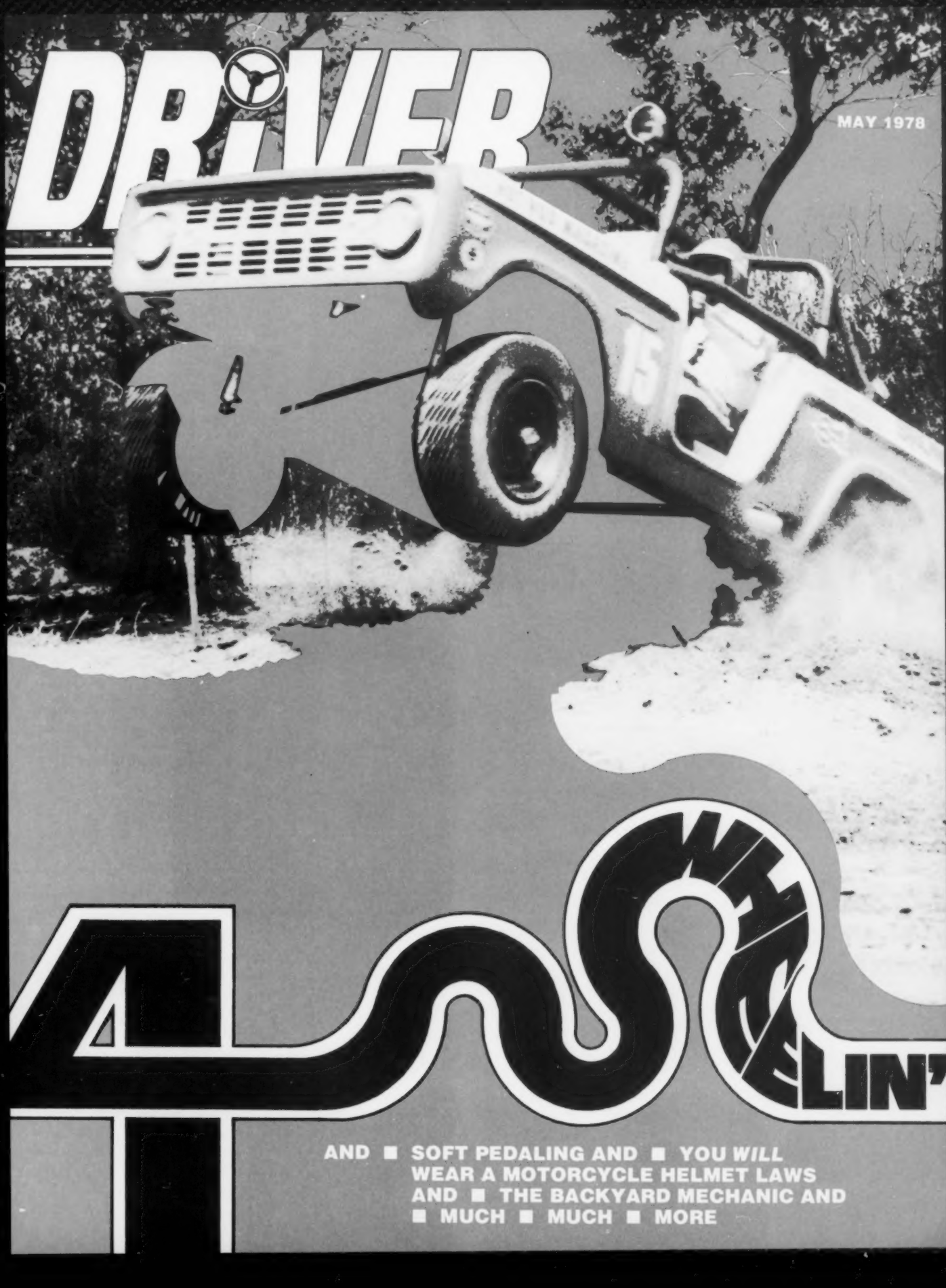
DRIVER
MAY 1978
WHEELIN'
AND ■ SOFT PEDALING AND ■ YOU *WILL*
WEAR A MOTORCYCLE HELMET LAWS
AND ■ THE BACKYARD MECHANIC AND
■ MUCH ■ MUCH ■ MORE

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FORE!

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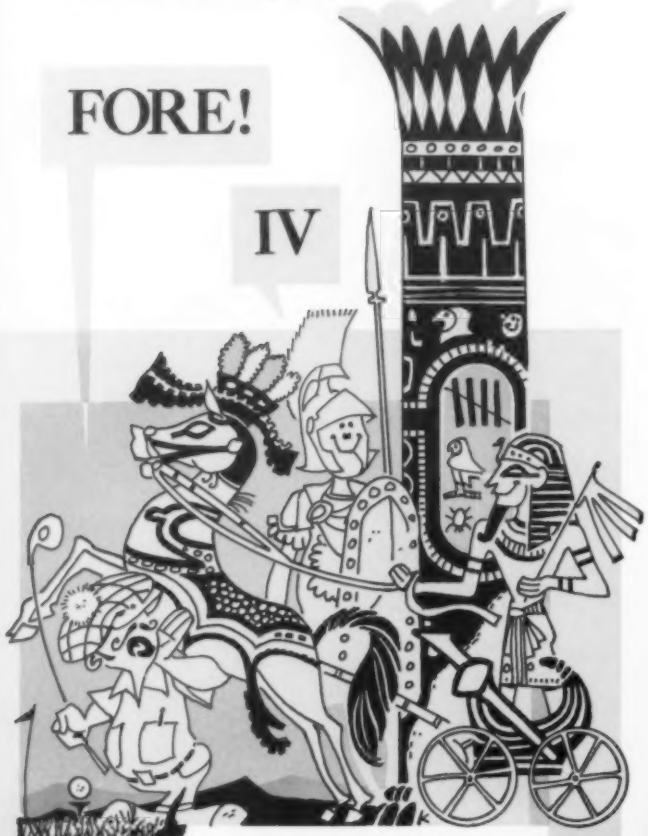

Wheeee

Fun or fear ...it's up to you

eelin'

occupants of the Fairlane, on their way OUT of the wash, offered to tow him. Ever mindful of the dangers of heat-stroke complicated by apoplexy, he gracefully accepted their kind offer and, when out of the wash, returned to the car dealer and began making loud noises about the off-road capabilities of expensive 4-wheel-drive vehicles vs. wheezing, automatic transmission-equipped used cars.

It was at this point that one of the salesmen informed him that there was a bit more to 4-wheeling than 4-wheel-drive and that technique was sometimes as important as traction.

4WD Is: It has been said by more than one callous wag that all 4-wheel drive does is allow you to proceed to a much worse place to get stuck in than you could if you had two-wheel drive.

While there may be a grain of truth to this statement, most of the time 4-wheeling is an extremely enjoyable sport and one in which the whole family can participate. Like most other sports though, there are a number of things that can get you into trouble more quickly than you could imagine and, like other sports, there are some basic rules of the game which can't be ignored if you want to keep the rubber side down and the shiny side up.

RULES OF THE GAME

■ Carry water. Water is more important than food in almost any emergency. It's unlikely that you would suffer any lasting ill-effects from going without food for three days, but three days without water, even in the north woods, would finish just about anyone. Depending on temperature, humidity, and amount of exercise, your body can require up to a gallon of water per day. Moderate conditions can still call for at least a half-gallon per day, and don't forget this is "per person," not for the whole tribe. If you find yourself in a "stranded" situation, don't try to do without water . . . you'll only bring on heat exhaustion. Drink what you feel you need and take your salt tablets. Stay away from radiator water since today's antifreeze/coolant fluids are "not good for you." As a last resort, you *could* drink water from little

continued

DRIVER

THE
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FOR THE MILITARY DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION AND SAFETY CENTER
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MAY

VOLUME 11 NUMBER 12

CONTENTS

Features	Page
4-Wheelin'	1
Mandatory Motorcycle Helmet Legislation: A Review of the Law	10
Take Ten . . . To Save A Life	14
Soft-Pedaling	18
Dirt Biker A Winner At 15	23
Departments	
Double Clutch	2
How It Happens	17
The Backyard Mechanic	24
Backfire	28
Beats Walkin'	Back Cover

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THE EDITOR SPEAKS
DOUBLE CLUTCH

RIDESHARING

Want to save $427 during the next 12 months without giving up a thing? It's easy. Just find somebody in your neighborhood who works where you do and arrange to take turns driving. If your round-trip commute is 20 miles a day, and you drive a standard American car, that's what you'll save—$427. If you can find two other people to carpool with, you'll save $553.

Most drivers don't realize what it costs them to drive back and forth to work. What's more important, they don't realize the amount of energy that could be saved nationally if everyone would carpool. If the average auto occupancy in rush hour traffic were increased from the present 1.3 to 2, the nation would save 250,000 barrels of oil and commuters would save $4.8 billion annually in operating costs and capital expenditures. About 15 million cars would be eliminated from rush hour traffic daily.

Employers could also save a lot because they would not have to provide so much parking space for workers. Parking expenditures per automobile, including land and construction costs, range from $600 for each surface space to $6,000 for each multi-level parking space. Operating and maintenance costs and taxes range from $200 to $1,000 annually per space. The federal government provides more than 207,000 free parking spaces for its people throughout the United States.

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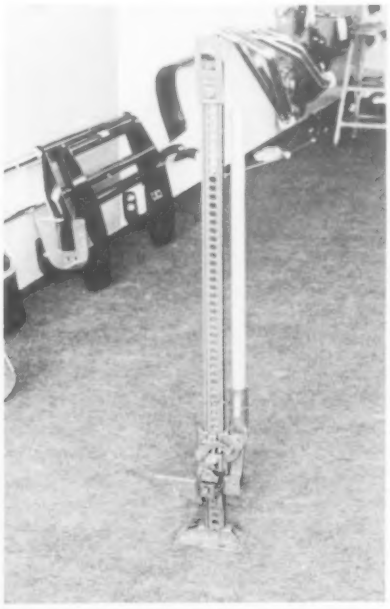


A good first-aid kit (left) is a must. This one is compact, waterproof, and fairly complete. A good hi-lift jack (right) is an off-road necessity.

pools in the ground, but only if there are recent animal tracks around it to indicate it isn't too poisonous. You may get sicker than the proverbial dog, though, so don't try it except as a last-ditch type of thing.

■ Emergency supplies: You should know how far away from help you're going to be, so carry sufficient food (AND water) to keep you going if you have to walk out for help. If you *must* walk out, figure 10 miles a day for easy terrain and mild weather, less as conditions dictate, and remember that this means a day's supplies for every 10 miles from assistance.

■ Don't travel alone if you're going into territory that isn't frequently visited by other off-roaders. Leave a "flight plan" with someone (like the Sheriff, maybe?) and STICK TO IT!

■ Don't try to walk out unless you know: where you are, where help can be found, and you have the strength and the supplies to make it. Usually, if someone knows where you are (you *did* leave that "flight plan" didn't you?) you'll be better off to stay with your vehicle and use it for a shelter while you await help (see "Survival In The Snow," DRIVER, Dec '77). Your car can provide you with signaling devices as well as shelter. Gasoline set afire in a hubcap by use of a long, burning stick makes a dandy smoke signal, while hubcaps, mirrors, and chrome pieces make very visible flashers. Make an SOS with broken bushes or clothing, or anything that contrasts with the ground. Keep your wits about you . . . panic never helped anyone get rescued.

■ If you MUST abandon your vehicle, leave a note on the steering wheel telling where you are going and what time and day you left. Keep out of the sun and desert heat by walking only during the cooler parts of the day, or by night if there's excellent moonlight. A general rule to follow is to walk downhill, following a stream if there is one, since walking downhill is easier than walking uphill, and water usually means you'll find some type of civilization.

■ If you haven't had the foresight to take along a map, at least make a log when you go into unfamiliar territory. Write down the mileage every time you change roads, pass a fork, pass a landmark, or cross a stream. If you DO get lost, you'll have a better chance of backtracking.

Bring alongs: Murphy's Law (variation 356) states, "What you fail to bring along will uniquely determine what will break."

If you have two spare tires, three will go flat . . . if you bring extra gas, you will run out of oil . . . if the fan belt breaks, you will always have a spare air-conditioner belt with you . . . and on and on and on. The following list of things to bring along is by no means complete. You will have to add or delete items peculiar to your needs, like, you wouldn't need a snowmobile suit if you're day-trippin' just outside of Yuma, Ariz., but you may need sunburn lotion even in Alaska. Our list of recommended items may be expensive to purchase initially, but a little out-of-pocket expense is a heck of a lot better than the alternative of not having things when you need them!

Battery jumper cables
Bailing wire or .032 safety wire
Epoxy kit
Pliers
Hacksaw
Hammers (large and small)
Permatex #1 & #2, or Form-a-Gasket
Flares
Fire Extinguisher
Sparkplug wrench
Sparkplugs
Coil
Tune-up kit
Brake fluid
Engine oil (at least enough for a complete change)
Spares for all engine drive belts (fan, alternator, etc.)
Penetrating oil
Fuel pump
Fuses
Generator and starter motor brushes, alternator diodes
Radiator stop-leak
Electrical wire (5 feet of sparkplug wire, 20 feet of 18 Ga.)
Wrench set (preferably open-end)
Tape (black plastic electricians)
Tape (grey "racers tape" or duct tape)
Flashlight
Siphon hose
U-bolts or adjustable hose clamps
Assorted nuts, bolts, washers, and sheet metal screws
Screwdrivers (standard and Phillips or crosspoint)
Tire irons

continued

continued

Spare jacks (one hi-lift and one small hydraulic)
Tire rim leak sealer
Tire gauge
Tire pump
Tire valve cores
Lug wrench (medium huge, not that factory thing)
Tire repair kit (for both tubeless and tubed tires)
Extra tire tubes (at least two)
Wooden platform for each jack (1′ x1′x¾″)
Axe
Shovel
Tow chain or strap (the best you can buy)
Spare water and gas

The racers' tape and the water hose clamps will usually turn out to be your best friends. The clamps can re-secure most things, from an exhaust pipe, to a broken leaf spring, to a broken tie rod (when used in conjunction with a jack handle). The racers' tape, when applied to a burst or cracked hose, will stop most water hose leaks if you loosen the radiator cap so there is no pressure on the system. It can hold broken glass in place, hold doors on, etc. . . . the stuff's got a million uses.

If you'll be venturing into the ol' hot-n-sandy, you'll need sand mats. Many people have found that a couple of one-foot wide, eight-feet long pieces of left-over carpet will do the trick. Others swear by burlap, lath metal or door mats. If you do not carry your sand mats with you, you will discover just how hard it is to free your vehicle from soft sand by using creosote branches which always grow at least two miles from where you are stuck.

Again, don't forget to pack along plenty of racers' tape. One of our editors can vouch for the fact that it has sealed a "gy-normous" hole in a radiator hose and lasted for 300 miles (when the pressure on the cooling system was released).

A Winch: Do you need a winch? Well, again, some people say that if you have a winch, you'll be tempted to try to go places you wouldn't ordinarily venture into, like swamps or wet mud flats. Most of the DRIVER staff are of the opinion that a winch is most valuable if you do your 4-wheeling some place where there are a lot of trees and wet places. Face it, if you're stuck in a sand wash, there usually isn't a whole lot of stuff around that you could hook a winch to. Some of you may be able to build an adequate "dead man" or sand anchor out of old creosote bushes, but we have found that getting unstuck from most sandy situations simply entails use of sand mats and some judicious digging.

Winches come into their own in the woods where there are good, solid tree trunks to attach the snatch block or hook to. Also, areas with trees usually tend to have slippery leaves on the ground, large amounts of moisture in the dirt, and streams and muddy areas galore so you'll need a winch more often. However, since recreational 4-wheeling is seldom a matter of "must get through" we feel that the safety problems inherent in winches can outweigh their benefit in many cases. Winch cables CAN break and snap back with deadly results, cable drums and cable brakes DO break occasionally, and fingers and hands CAN get caught during rewind and cable feed.

Extra lights come in all shapes and sizes. Best bet is one fog lamp and one hi-intensity driving lamp.

(far right)
If you can't afford an auxiliary air compressor, this kind is reliable and inexpensive, hooks up to spark plug hole.

(near right)
Aftermarket seats like these offer head and neck protection and keep you from sliding around during the more athletic off-road ventures.

Winches are expensive to purchase and install, and can be bears to maintain properly. To be completely fair though, when we've been stuck in the mud a long way from home, the nicest thing to see is a fellow 4-wheeler with a winch on his rig.

Technique Counts: As our novice 4-wheeler found out, there is more to

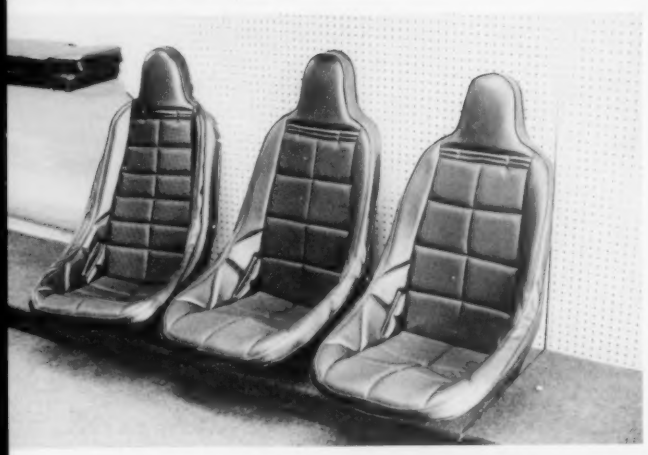
continued

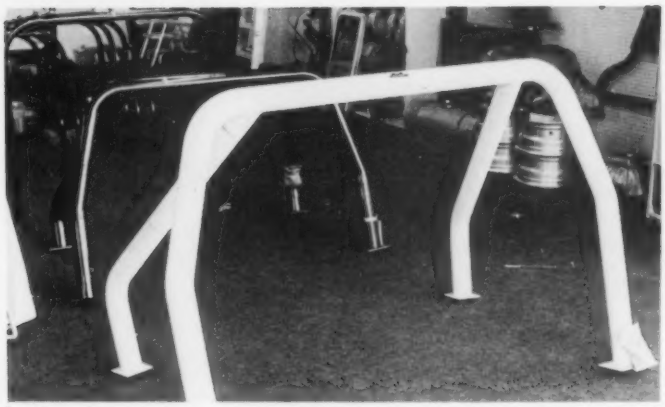
(far right)
Roll bars are nice to have, although padding should be added to the cross piece and the upper portions of the downtubes.

(near right)
Trenching shovel folds for easy storage, has straight neck for easy access to buried axles when needed.

(left)
Needed take-alongs don't alway have to occupy a lot of space. This kit is pretty complete, doesn't weigh a lot.

Remember, just because you're equipped for off-road travel, not everyone else is. This sight is also a reminder to take it easy in the boonies . . . imagine trying to get stopped on gravel or soft sand as this turkey quickly fills your windshield!





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off-roading than just using gobs of power applied to huge tires. At least he didn't make the mistake many novice sand-masters make . . . he engaged the front hubs! Now, many of you who own new rigs have full-time 4-wheel drive, or can at least select the all-wheel drive function from the driver's seat, but it wasn't always so! In most 4-wheel drive systems over a few years old you have to get out of the vehicle, go around to each front wheel, and manually select the "lock" position for the front axle to be engaged. Don't laugh . . . there are a lot of people out there who got stuck and stayed stuck because they forgot to lock the front hubs. Along with this phenomenon goes the tremendous feeling of helplesness you get when you don't select a 4WD-HI or 4WD-LO range on the transfer case selector inside the passenger compartment. You have to engage all the bits and pieces or you haven't got 4-wheel-drive.

Briefly, if you have a range selector in the cab, you engage the driveshaft to the front axle by use of the range selector lever. 4WD-HI means that you will have normal gearing and power delivered to the wheels. 4WD-LO means that you are operating all wheels with a multiplication of about 2.0; in other words, you will go half as fast in any gear for the same engine rpm, but power is multiplied about two times. Remember though, moving the range selector (actually, you engage the transfer case) to 4WD-HI or -LO only engages the front drive shaft . . . to get the front wheels to function as drive wheels you must engage (or lock) the front hubs.

In the center of each front wheel there is a metal piece extending outwards, and in the center of that is a recessed knob. By turning the knob to the "lock" or "engage" position, you engage the driving force of the front axle and connect it to the wheels.

There are speed limitations for the 4WD and range functions, so be sure to check in your owner's manual before trying out your new toy. At this point, all you off-roaders who have full-time 4WD can chuckle up your sleeves . . . those of you who don't, remember to select 4WD and lock those front hubs . . . it'll make your 4-wheeling a lot easier.

One thing to remember about cresting a hill . . . you don't always know what's on the other side. Either walk your route beforehand, or take it nice and slow so you won't get any nasty surprises.

On The Highway: OK, enough of the insults to the novice 4-wheeler . . . it's time to get off the road! But, getting OFF the road implies that you were ON a road to begin with . . . hence some quick tips. One, your rig weighs a lot. That means that your braking ability may be a bit on the marginal side. Always allow huge amounts of following distance on the highway . . . and if you're running supercollossal-jumbo-huge tires, they contribute mightily to unsprung weight and cause, shall we say, "handling deficiencies." Increased tire diameters make the vehicle's roll center (sort of like the center of gravity) go up and you can tip that devil over a lot easier than when using stock-sized tires.

Two, remember that if you're running the big tires and wheels, your rig will ride higher than any passenger car and if you DO happen to hit someone from behind, your bumper will ride right over his bumper with ease. You wouldn't want to accidentally create an Olds 88 pick-up, would you?

On the highway, maintain your tire pressures at or near the manufacturer's recommended maximum. This will help mileage and handling, the tires will last longer, and the tread noise may not be as high. Big tires generate big amounts of heat, too, and running them near max pressure will lessen sidewall flex and therefore lessen heat.

Tire Pressure Important: When you reach the end of the pavement, lessening the tire pressure is one of the first things (next to putting it in 4WD and locking the hubs) that should come to mind. Decreasing the pressure for off-roading will improve traction in the soft stuff, give a better ride, and allow the tires to absorb greater shocks. Lower pressures do allow the tires to be more easily punctured by stones, cactus, lightning bolts (thrown by the god of flat tires), etc., but if you're not trying for a record time in the Yuma to Bisbee crossing, the softer tires are a better idea since we can all steer well enough at slow speeds to avoid the rocks and cactus.

When deciding how much to lower the pressure in your tires, consider the weight of the vehicle, its load, the type of tire, and the number of tire plies. And remember, no one will call you a fanatic just because you happen to carry a handy little chart from the tire manufacturer that gives minimum inflation pressures vs load.

LO Range: Moving right along, the friendly staff at DRIVER recommend you experiment a lot with the 4WD-LO range in your vehicle. Many drivers don't use it enough for one reason or another, but we think it's the neatest thing since holes in doughnuts. It's prime advantage is the control it gives you. Not only do you get better grade-climbing ability, you get to go *down* the other side of the hill under control. The moment you let up on the accelerator, the engine compression will slow you down.

LO range allows you to pick your way along a rocky section with complete control, yet it is easy to pick up speed again because there is plenty of torque available.

Select LO range at the first sign it will be needed. If you are in HI range and halfway up a hill when you begin to lose headway, that's a pretty poor time to try to select LO range. The same applies to sand or mud . . . get into that LO range *before* you need it.

Tire pressures can make a lot of difference in traction. A good tire pressure gauge used in conjunction with a load chart is an excellent way to avoid getting stuck.

Of course, some drivers don't believe in shifting down the main transmission when climbing a hill until it is apparent that LO will be needed. This doesn't work too well because when you take the time to shift down, you lose the advantage of momentum and you risk breaking loose the driving wheels. Once those wheels start to spin, they dig in, and you don't really need that grief. Put it in LO *before* you need it.

Hills: So, you're in LO and climbing a hill . . . what happens if you begin to spin the wheels halfway up? Well, first, you should remember that halfway UP is almost the same as halfway DOWN. With that fact in the back of your head, try swinging the steering wheel from side to side. This is known as "walking" the vehicle. What this does is put the drive wheels on earth that isn't too torn up and give you a fresh bite into the surface for better traction.

If that doesn't work and you stall the engine, pray. NO, seriously, if you have a standard transmission, immediately shift into reverse and let the clutch out. That'll get the engine running again and the brakes should hold you. If you have an automatic transmission, shift to neutral and start it up again. Then, back down the hill IN REVERSE WITH THE ENGINE RUNNING AND THE CLUTCH ENGAGED. NEVER, NEVER, NEVER try to back down a hill in neutral! If you followed our advice and had it in LO range, the engine compression, coupled with easy use of the brakes, would keep you under control. Don't try to turn around . . . just back down the hill and try to keep the wheels straight. ALWAYS *DRIVE* DOWN A HILL . . . NEVER USE NEUTRAL.

And speaking of going down hill, but proceeding in a "forwardly" direction, LO range is still the hot set-up. However, if you've neglected to follow our advice and still have your trusty steed in HI range, don't try to shift the transfer case to LO. You generally can't shove the lever to another range unless you're *ac*celerating, due to the arrangement of the transmission's internals, and if you try it going down hill you will wind up with no compression braking and your face will break out. You paid for a car with funny levers sticking out of the floor, so use them, and use them at the appropriate time.

A last little word of caution about hills . . . please don't try to climb or descend a hill on a diagonal course. If you lose traction and skid even a little, the whole rig could turn turtle and you will find yourself rolling down toward the bottom in a series of ODNEs. ODNEs are like a biker's ENDOs, only different. Most 4WD rigs will climb hills surprisingly well, going straight up, so why risk putting scratches on that shiny new roll bar? If you *absolutely have* to travel across a slope, choose a mild angle of attack and keep moving steadily.

Water Crossings: "Columbus did it, why can't I?" seems to be the attitude among a minority of the off-road set when it comes to water crossings. Well, in some instances, there are very good reasons why you can't, or at least shouldn't, try to cross unknown bodies of water in your 4WD. One good reason is that water is generally wet. This is no big thing in itself, but "wet" and "electricity" don't get along too well. If you get your ignition components wet during a water crossing, the engine may cease to function. We aren't too crazy about the thought of being stranded in the middle of a stream which will flood the passenger compartment as soon as you open the doors to go get under the hood.

Being serious for a minute, water crossings do crop up a lot in 4-wheeling, and there are some precautions that should be taken if you don't want to ruin your day. If you'll be fording a stream, stop, get out, and take a long look at it. Has anybody else been through it lately? Wet tracks on the sides of the stream are a good indication. How swift is the water? How deep? What kind of a bottom is there? Is the water level rising?

Fast running streams usually don't allow slippery moss to build up on rocks, like in slow-moving water, so you will have better traction with a fast stream. But if the stream is too fast, you can sideslip right down to Cucamonga quicker than a Chief turns in his papers at 30. Anything over two feet deep should be reason for you to seek another way around, or at least a shallower ford.

If you determine the water is crossable, make sure you're in 4WD-LO and attack. Slow and steady is the trick here. Go slow but keep your speed up to where you build up a "bow wave." This wave will keep water in the engine compartment at a level lower than that of the important ignition components.

Try to pass on the upstream side of large rocks. Currents erode the streambed on the downstream side and you can find your tire dropping into a large hole.

Once on the other side, check the brakes. Even machines equipped with disc brakes can have brake fade after immersion in water, so drive slowly and "drag" the brakes until you feel them beginning to take hold again.

Water plays #@# $%¢& with many mechanical components, so after a day that involves water crossings there is some minor maintenance that needs to be accomplished. Front wheels should be pulled and the wheel bearings checked and repacked with lithium or other water-repellent grease. This is needed because as you drive along, the wheel bearings heat up. When you immerse the front end in water, a vacuum is created because of the sudden contraction of hot parts and lubricant, and

continued

There's a right way and a wrong way to make a water crossing. This is *not* the right way!

(far left)
It works the same in snow and in sand . . . if you think you can't make it, try to back up in your tracks. About 12 feet later, our trusty Bronco was in dire need of chains. It would have been easier to put the chains on and drop into 4WD *before* deep snow got to us. We just hate shovelling snow or sand due to lack of foresight.

(near left, top)
Winches have their advantages and their disadvantages. They're great for getting you unstuck, but their extra length can hang you up on deep gulley or stream crossings.

(near left)
This innocent looking mine shaft entrance was protected by wooden barricades and signs, but it was at the crest of a hill and a Toyota Land Cruiser wound up at the bottom of the shaft. The driver and passenger didn't leave a "flight plan," so they spent three uncomfortable days down there.

water is sucked in (remember, the same thing happens with boat trailers).

The axles may also need to be drained and refilled. Manufacturers include a vent system on axles, and unless they have a one-way valve setup, water will get into the axles in the same way and for the same reason as the wheel bearings. Same thing goes for transmissions, both manual and automatic . . . check 'em out and save yourself some money and some grief.

Stuck In . . .? If you drive off-road you either: 1, have been stuck; 2, are stuck; or 3, will be stuck. It's guaranteed. Getting stuck is really no big thing . . . most of us have done it at least once. But it's how you get UNstuck that separates the adults from the children.

Of course, you have seen fit to follow our advice and you have at least two jacks (in addition to the factory-supplied one) and jack pads with you at all times, one jack being a hi-lift type, the other being a compact hydraulic or scissors-type. You'll also have had the foresight to bring along your sand (or snow) mats and a shovel with a straight neck. So, now to the business at hand.

You've been driving up the wash and suddenly your speed slows, the steering gets heavy, the tires lose their grip, and *voila,* you're stuck. Like most of us, your first move is to try to back up . . . and like most of us, that move usually fails. So, get out and look around. Check the situation thoroughly before you do anything else. See how far it is to solid ground. Should you try to go forward or back up to good footing? Are you buried to the axles or are you hung-up and high-centered? Can your buddy get close enough to use a tow chain?

If your buddy has a winch or tow chain, it's usually best to tow out backwards since you were able to get this far in the first place. If you are out there alone (shame on you, we told you not to try it) you're going to have to go to work.

We know you probably remember, but we'll remind you anyway . . . NEVER climb under a vehicle that is supported only by a jack.

Using the hi-lift jack (we use the factory bumper jack either as ballast or as an anchor . . . never as a bumper jack) and a wooden jack pad, get the wheels off the ground and then shovel material under the tire. Do this for at least the wheels nearest solid ground, preferably for all wheels. The last thing to go under the wheel is the sand mat. If you don't have sand mats, use brush, an old blanket, or rocks.

If you can't get the wheels high enough to get something under them, shovel gentle ramps for all the wheels and *dig* out under one wheel at a time to try and get some solid traction-aiding device under it. Don't forget to clear the sand (or snow) from the *side* of the wheel so loose stuff won't fall back in the hole as soon as you try to move the rig.

If you find that you can't use the hi-lift jack to get the body high enough to get the weight off the wheels, dig a hole under the axle, place a jack pad or flat rock at the bottom of the hole, and use the hydraulic or scissors jack to get the axle up.

After you have ramps for each wheel, and sand mats under at least two wheels, try to *gently* move the vehicle. Automatic transmission-equipped vehicles have the advantage here, because it is easier to apply gradual power increases. With a standard transmission, you have to slip the clutch. A little braking can help because it may keep the wheels from spinning suddenly. Steady does it . . . gradual power combined with any kind of momentum at all will get you out (or at least a few feet closer to solid ground).

Stuck On . . .? High-centering is when you get hung up on some object. It may be a stump, a large rock, the center hump in the road, or even compacted snow. Your vehicle's momentum may carry you onto one of these nasty things and remove the weight from the wheels with the result being an alarming lack of progress in any direction.

Like getting stuck down *in* something, getting stuck *on* something requires that you bail out and have a look. You may see that it will simply be a matter of backing off the high-center, or you may find that the stump you just ran over leans in the direction that you were traveling and so you can't back off the thing 'lest you tear up an axle or steering rod.

If you can't drive off, raise the vehicle with the hi-lift, or the axle with the hydraulic, and place rocks, jack pads, or similar solid objects (please do not use 2d Lieutenants for this purpose) under the wheels. The purpose of this exercise is to get traction for the wheels, so your build-up must be stable and solid. If you get the weight off the bottom of the vehicle and back on the wheels, you'll be in business.

With the wheels up in the air in a high-center situation, your limited-slip axles won't do much good since at least one wheel must have traction to cause the axle clutch cones to lock up. If you gently apply the brakes while gently spinning the wheels, the limited-slip function will work and if any wheel has even a little traction you may begin to move. And like any 4WD situation, once you get moving, you're usually OK.

See You There: Four-wheelin' is a good, clean, family-type sport. If you use some common sense, travel in a group whenever possible, and don't drive in unfamiliar territory where there may be abandoned mine shafts, it's a sport that can't be beat. Whether you're an amateur rockhound, a seeker of out-of-the-way places, or just someone who likes to do something with the whole family, you can have a ball.

Of course, if you're ever driving down a sand wash near Hesperia, California, and you see an orange-and-white Bronco stuck in the sand, stop and give a hand . . . the life you save may be that of one of our editors!

Mandatory Motorcycle Helmet Legislation

A REVIEW

Every month DRIVER receives a dozen or so letters from motorcyclists on the subject of helmet laws. The letters are interesting to us because almost invariably half are from readers who believe wholeheartedly in helmet use laws, and half are from readers who hate such laws and think they are unconstitutional. (We hasten to add that some of the cyclists who hate the laws love their helmets and would never ride without them.)

Most of the "hate the laws" group reason that it is their neck being risked and the state has no business telling them they can't risk it if they want to. Our answer is the old one about the cost to society: Public police and ambulances pick up the cyclist, transport him to a public hospital where he is cared for by public doctors. Society provides unemployment compensation while he is recovering from injuries and, if the injuries are permanent and he cannot work, provides subsistence for him and his dependents ever after. Therefore, society can try to stop cyclist injuries.

Our readers don't necessarily buy that argument. Okay, they say, in that case we should have laws requiring drivers and passengers in cars to wear their seat belts and wear helmets, too, because car accidents cost society a lot more than motorcycle accidents. And so we are left muttering at our typewriters because we don't have any more answers and we don't even have a nodding acquaintance with a constitutional lawyer.

All of this is by way of explaining why we were so pleased to come across the following article by Paul A. Ruschmann. Mr. Ruschmann is a Research Investigator in the Public Factors Division of the Highway Safety Research Institute at the University of Michigan. The article was first published in the Institute's *Research Review*.

After examining the court decisions, Mr. Ruschmann finds almost unanimous judicial opinions that helmet laws *are* constitutional—a state does have the right to pass a helmet-use law. The arguments that such a law infringes on the cyclist's liberty and "right to be let alone" do not impress the courts. But they *do* impress state legislatures, which is one reason helmet laws are being repealed in many states. And Congress took the big clout away from the Department of Transportation when it told DOT it could not withhold federal highway money from states which did not pass helmet laws.

Mr. Ruschmann's article is not easy reading, but if you are a cyclist, a safety officer or a commander you will find it very interesting.

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University of Michigan Highway Safety Research Institute's *RESEARCH REVIEW*

INTRODUCTION

Whether states and municipalities may require motorcycle operators and passengers to wear protective headgear is an issue currently being debated in a number of state legislatures. The arena of this debate has returned to the states following congressional passage last year (1976) of the Federal-Aid Highway Act, Public Law 94-280, which curbed the power of the Department of Transportation to penalize those states that did not enact headgear legislation. (States may still, however, be subjected to penalties for not requiring persons under the age of 18 to wear helmets.)

Prior to the passage of Public Law 94-280, the principal method used by opponents of headgear legislation to attack such statutes was to challenge their constitutionality. Their constitutional argument typically began with an assertion that such statutes were designed solely to protect cyclists from themselves, not to protect other members of the motoring public. This being the case, the opponents argued, the state or city had acted beyond the limits of its police powers.

The constitutional challenges to state headgear legislation raised the difficult legal and philosophical question whether, and to what extent, government may act to protect people from their own indiscretions. The minority of courts that met this question directly concluded that governments do, at least in some cases, have such power. Most courts, however, took pains to conceive of social benefits stemming from headgear legislation. All in all, the great weight of judicial authority concluded that motorcycle *helmet laws raised no constitutional issues:* these statutes were within the scope of legislative power; and the opponents' arguments were for the legislature – not the courts – to consider.

This article examines the various constitutional arguments raised by opponents of headgear legislation. Even though the arguments have carried little legal weight, they do possess social and political force, which, when considered with more pragmatic arguments directed at the effectiveness of helmet laws, have persuaded legislators in many states to repeal or amend existing helmet-use statutes. The constitutional arguments discussed here, moreover, are not totally lacking in vitality, and these may furnish the basis for successful attacks upon future crash countermeasure programs.

by PAUL A. RUSCHMANN

OF THE LAW

BACKGROUND

The first headgear legislation was passed by the New York legislature in 1966. The New York statute, forbidding any person from operating or riding upon a motorcycle on public streets or highways without wearing an approved protective device, served as a model for most other states' helmet laws. Massachusetts and Michigan followed New York's lead and enacted similar legislation.

That year Congress passed the Highway Safety Act of 1966, which required states to implement highway safety programs approved by, and in accordance with standards promulgated by, the Secretary of Transportation.

In June 1967, the Secretary released Highway Standard 4.4.3, which required states to pass helmet-use statutes. All but three states fully complied with Standard 4.4.3: California never adopted headgear legislation; Utah required helmets to be worn only at speeds over 35 mph; and Illinois' statute was repealed after it was declared unconstitutional.

Challenges to the constitutionality of headgear legislation were raised in the appellate courts of 35 states. Only the Supreme Court of Illinois struck down the state's helmet-use statutes; courts of last resort in 27 other states and intermediate appellate courts in six others upheld such laws against constitutional challenge.

Congress, in effect, repealed Standard 4.4.3 and made passage of helmet-use laws a matter of state option in 1976 when it stripped DOT of the power to withhold highway funds from states that failed to require helmet usage by persons 18 and over. As of this writing (Aug '77), seven states have repealed their helmet-use laws entirely (two others had no such law in effect when Standard 4.4.3 was repealed), and 16 others have exempted persons aged 18 and over from the requirements. Several other states have weakened their helmet-use laws by adding a provision declaring failure to wear a helmet not to be negligence *per se*. Bills proposing amendment or repeal of existing headgear legislation are presently before a number of other state legislatures.

LEGAL BASIS FOR HEADGEAR LEGISLATION

Headgear legislation is an exercise of a state's police power, which includes the power to enact laws – within constitutional limits – to promote the public health, safety, morals, or welfare. While the bounds of the police power are not capable of precise definition, it may constitutionally be exercised, even to the point of interference with personal rights, provided two requirements are met:

- The public interest, not the interests of a particular person or group, requires interference with individual rights; and
- The means of carrying out the public interest are both reasonably necessary to accomplish it, and are not unduly oppressive upon individuals.

Two other considerations strengthen the case of the constitutionality of headgear legislation: The first is the general presumption of constitutionality afforded statutes passed by the legislature. The second consideration goes to the state's plenary power over its highways, to regulate for the safety and the best interests of the public.

In enacting headgear laws legislatures must rely upon a "public purpose" to support them. The public purpose furthered by this legislation, as defined by the courts, has ranged from the indirect public benefits of protecting an individual motorcyclist from the consequences of his own dangerous conduct (the "self-protection" theory) to the direct harm to all highway users who share the public roads with unprotected cyclists (the "direct-harm" theory).

The "self-protection" theory of public benefit focuses on the interdependence of an individual's actions and the interests of the state; that is, when a person neglects his own health, safety, or welfare, all of society suffers. The societal costs take the form of lost productivity, higher welfare costs, increased insurance rates, and the like. Under this reasoning the state may take action to protect itself by forcing individuals to protect themselves.

The "direct-harm" argument limits itself to the dangers posed to specific members of society as a direct result of an individual's failure to protect himself. The example typically cited by the courts involves a helmetless rider, who is struck in the head by a flying object, loses control of his cycle, and collides with other traffic.

These arguments, singly or in conjunction, have provided the basis for judicial findings that helmet-use statutes are valid exercises of the state's police power.

CONSTITUTIONAL ATTACKS ON HEADGEAR LEGISLATION

1. Attacks on the Purpose of Helmet-Use Statutes

Since the validity of the police power depends on the existence of a valid purpose and reasonable means for carrying it out, constitutional attacks on its exercise turn on challenges to the existence of either or both of them.

continued

Early court challenges to helmet laws alleged that they lacked a public purpose, since they dealt only with an individual's private welfare and not that of society as a whole. Such legislation, argued the opponents, was an unjustified infringement of personal liberty.

Opponents who made such general attacks on headgear legislation raised one or both of the following arguments: substantive due process, a blunt attack upon the power of the legislature to pass helmet-use laws; and privacy, alleging that cyclists enjoyed a so-called "right to be let alone" from state intervention.

Some courts met the opponents' arguments directly, and declared self-protection to be a legitimate public purpose. The chief justification they cited in behalf of self-protective safety legislation was the so-called "public-charge" theory articulated by the court in *Simon v. Sargent (Mass):*

"From the moment of the injury, society picks the person up off the highway; delivers him to a municipal hospital and municipal doctors; provides him with unemployment compensation if, after recovery, he cannot replace his lost job, and, if the injury causes permanent disability, may assume the responsibility for his and his family's continued subsistence. We do not understand a state of mind that permits plaintiff to think that only he himself is concerned."

Other justifications for self-protective legislation include the state's interests in maintaining a productive citizenry, the effect of motorcycle accidents on insurance rates, particularly in "no-fault" states, the value of helmet use in mitigating damages, the strong public policy against self-destruction, making illegal, for example, suicide pacts and self-maiming, and the preservation of life for its own sake.

Some courts and judges refused to find a public benefit flowing from helmet-use statutes and concluded that those laws were an unjustified invasion of personal freedom. A typical statement of this "no public purpose" reasoning was made by the Supreme Court of Illinois in *People v. Fries:*

"However, the legislature may not, of course, under the guise of protecting the public interest, interfere with private rights . . . The manifest function of the headgear requirement in issue is to safeguard the person wearing it – whether it is the operator or a passenger – from head injuries. Such a laudable purpose, however, cannot justify the regulation of what is essentially a matter of personal safety."

The dissenters in the Utah decision and the Michigan decision argued that helmet laws were an imposition of government authority into areas of private conduct and not a proper function of government.

In contrast to the opinions adopting reasoning similar to that employed in the Utah and Michigan opinions, the great majority of courts have been inhospitable toward claims of privacy. Typical of these was the Wisconsin court which stated:

"There is no place where any such right to be let alone would be less assertable than on a modern highway with cars, trucks, and busses and cycles whizzing by at sixty or seventy miles an hour. When one ventures onto the highway, he must be expected and required to conform to public safety regulations and controls . . ."

Even in those states that adopted one version or another of the self-protective theory the court frequently made it clear that not all such enactments would be upheld. Some courts, including the Supreme Court of Michigan, accepted the headgear requirement, but carefully limited their rulings to the helmet laws themselves and reserved the option to strike down in the future more restrictive safety measures, for example, mandatory seatbelt laws. These courts used a balancing test to sustain the challenged headgear legislation; for example, the Supreme Court of Hawaii articulated its version of the balancing test, the theory of "significant secondary harms":

"Viewed without limit, of course, 'secondary harm' arguments could justify an impermissibly wide range of governmental interference with private liberties . . . However, that merely because protecting the public from secondary harms could logically justify a vast range of governmental interferences with individual liberty, and merely because we could define secondary harms as including anything lessening the full development of an individual's perfection, this does not mean that such interference is always improper."

Then, after noting the relationship between headgear legislation and reduction of injuries to cyclists, the court observed:

"With the great danger of primary harm to helmetless cyclists as well as the rationality of helmet wearing as a safeguard thus statistically supported, the magnitude of secondary harms of the nature indicated above is sufficiently great to justify the law at issue in this case. In answer to the reductio ad absurdum argument of the dissent in this case with respect to the extent of governmental intrusions justifiable by secondary harm analysis, we refer to the statement (in an earlier decision which upheld the state helmet law as constitutional) that 'this holding is limited to this case.' "

Similarly, the Michigan court concluded that headgear legislation placed a relatively minor burden upon cyclists while benefiting both cyclists as a class and society as a whole.

Many state courts, rather than construct social benefits from enforced self-protection of motorcyclists, viewed such statutes as means of preventing direct harm to other motorists. A typical judicial statement of this rationale is as follows (Wis.):

"Not all highways are deserted these days; in fact, few are. If the loss of cyclist control were to occur on a well-travelled highway, the separation be-

tween consequence and incidence is less sharp. Anything that might cause a driver to lose control may well tragically affect another driver. If the loss of cyclist control occurs on a crowded freeway with its fast-moving traffic, the veering of a cyclist from his path of travel may pile up a half-dozen vehicles."

The Michigan Court made a similar argument but added another class of direct harm that an unprotected cyclist might cause another motorist:

"For example, the helmet law benefits the driver of a vehicle which may accidentally collide with a motorcyclist. Since the helmet is designed to reduce injury to the cyclist, it also has a concomitant effect on the status of the automobile driver. If the helmet succeeds in mitigating what would otherwise be a fatal injury, then not only has the cyclist survived, but the automobile driver has not killed anyone."

Courts have regarded the "direct-harm" rationale as stronger than arguing the indirect social effects of one of the various "self-protective" theories, and even some courts that may endorse self-protection as a valid basis for legislation have preferred to base their holdings on the direct-harm rationale.

2. Attacks on the Means of Furthering the Public Purpose

Challenges to head gear legislation that alleged infringement of personal liberty or argued that the state went beyond its police powers were almost uniformly rejected by courts. As a result, opponents of headgear legislation shifted their attack from the purpose furthered by headgear legislation to the means furthering that purpose. A variety of challenges were raised to helmet-use statutes; here again, nearly all were turned down by state courts. These challenges have included:

- *Denial of equal protection,* alleging that cyclists have unreasonably been placed in a class separate from other motorists and then unjustly regulated on the basis of that distinction. Courts rejecting equal-protection challenges have pointed out the physical characteristics of motorcycles, the use to which cycles are typically put, and the increased accident exposure of cycles as justifications for classification and treatment different from automobiles and trucks.

- *Vagueness,* alleging that the standards for helmet use failed to give motorcyclists fair notice as to what type of headgear would comply with the statute. The courts responded by determining the term "helmet" to have a specific meaning when applied to motorcycle headgear, just as it does in the case of fire, police, and football helmets.

- *Illegal delegation of powers,* alleging that the legislature, by giving an administrative body power to establish headgear standards, unlawfully permitted it to act as a legislative body. Courts have concluded that headgear legislation is a lawful delegation of power provided it describes the job to be done, who must do it, and the scope of his authority.

- *Infringement of the right to travel,* alleging that headgear legislation is an unwarranted interference with that right. Courts have emphasized that helmet-use statutes merely regulate and do not prohibit travel. The courts have similarly rejected contentions that headgear legislation unfairly burdens interstate commerce, declaring that compliance with such laws is a slight burden.

- *Abridgement of freedom of speech,* alleging that headgear legislation restricts the cyclist's freedom to express an idea. The courts have pointed out that helmetless operation of a motorcycle has a predominant "non-speech" component, conduct that may be regulated by the police powers of the state.

CONCLUSION

A review of the case law dealing with challenges to headgear legislation leads to the following conclusions about these laws:

- With a single exception, every state court of last resort has sustained headgear legislation as a valid exercise of the police power.

- The courts are not in agreement, however, as to the rationale for upholding headgear legislation. There is some dispute as to whether "self-protection," standing alone, is a valid basis for legislation.

The almost unanimous conclusion of the courts, that states may constitutionally enact headgear legislation, establishes the narrow legal principle that there exists no constitutional prohibition against passage and enforcement of helmet-use statutes. The judicial opinions do not establish whether it is wise or politically advantageous to enact such legislation.

Arguments directed against these statutes, particularly those based on liberty and "the right to be let alone," have political and social force in legislatures, which are bodies intended to hear and consider those very arguments.

The trend toward amendment or repeal of headgear legislation by state legislatures, following Congress's decision to return to the states the decision whether or not to enact such statutes, reveals the political and social strength of those arguments unsuccessfully urged in the courts.

Note: We have omitted the case names, court designations and dates to save space and because we did not believe most readers would be interested. If you want to know the designation of a particular case, please let us know and we will supply the information.

The tranquil atmosphere that normally abounds among the ci
central Florida was recently shattered as a movie film crew
to a picturesque lake outside Polk City. They came for one
produce a new Army film for the U.S. Army Agency for Aviation S
"Drowning: The Cold Facts."

Leave you cold? Read on! This is no ordinary training film. N
is the information it presents nor the actors wh
in a totally unique way. Check the cas
Rocks" fame. You've seen him
On The Prairie," and on the
watched him doing comme
itos, to name a few.
production, "Cat Fr
Neal Gold and Bo
performers, sha
its, which i
TV

Maj Mason (Rick Hurst) peeks at contents of first crate . . .

Then seems to be praying after viewing Marty (Neal Gold) the "modern" robot sent him by the Pentagon for use in film . . .

But his spirits rise when he sees Maggie (Bobbie-Ellyne Kosstrin), the second robot, and . . .

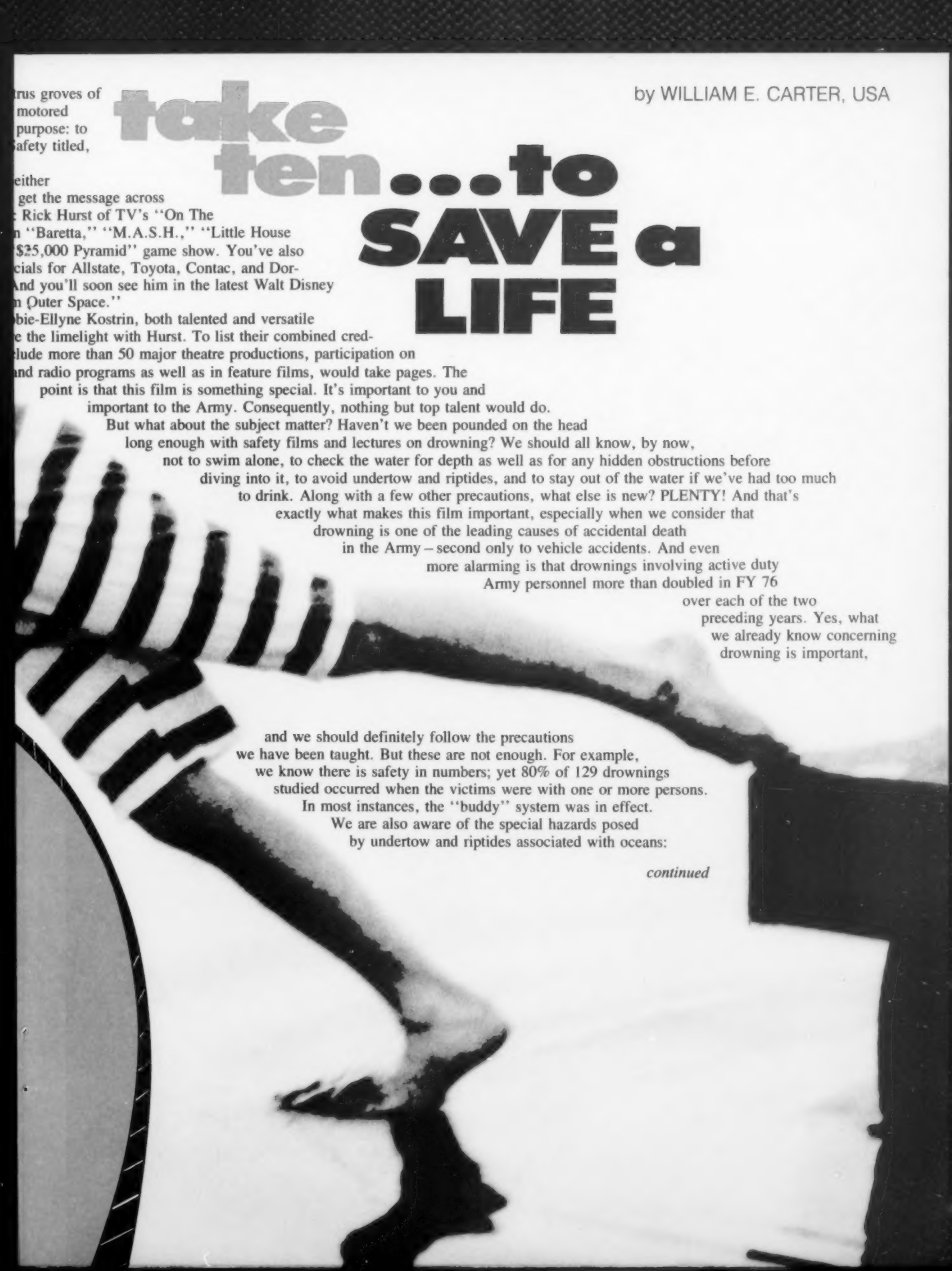
by WILLIAM E. CARTER, USA

take ten...to SAVE a LIFE

trus groves of
motored
purpose: to
afety titled,

either
get the message across
Rick Hurst of TV's "On The
n "Baretta," "M.A.S.H.," "Little House
$25,000 Pyramid" game show. You've also
cials for Allstate, Toyota, Contac, and Dor-
And you'll soon see him in the latest Walt Disney
n Outer Space."
bie-Ellyne Kostrin, both talented and versatile
e the limelight with Hurst. To list their combined cred-
lude more than 50 major theatre productions, participation on
nd radio programs as well as in feature films, would take pages. The point is that this film is something special. It's important to you and important to the Army. Consequently, nothing but top talent would do.

But what about the subject matter? Haven't we been pounded on the head long enough with safety films and lectures on drowning? We should all know, by now, not to swim alone, to check the water for depth as well as for any hidden obstructions before diving into it, to avoid undertow and riptides, and to stay out of the water if we've had too much to drink. Along with a few other precautions, what else is new? PLENTY! And that's exactly what makes this film important, especially when we consider that drowning is one of the leading causes of accidental death in the Army – second only to vehicle accidents. And even more alarming is that drownings involving active duty Army personnel more than doubled in FY 76 over each of the two preceding years. Yes, what we already know concerning drowning is important,



and we should definitely follow the precautions we have been taught. But these are not enough. For example, we know there is safety in numbers; yet 80% of 129 drownings studied occurred when the victims were with one or more persons. In most instances, the "buddy" system was in effect. We are also aware of the special hazards posed by undertow and riptides associated with oceans:

continued

continued

yet, only 5 of the 129 "off-duty" drownings occurred in oceanic waters. The rest happened in inland bodies of waters such as rivers, lakes, and ponds.

Nonswimmers are constantly cautioned to learn to swim – and they should. But . . . only two of the 129 victims studied were nonswimmers.

We have been taught how important it is for us to be in good physical condition before exerting ourselves in the water. Again, 96% of the victims were found to have been physically fit males under 30 years of age.

Why does a strong swimmer suddenly begin to falter in the water, then silently slip beneath the surface and drown? Why does an individual jump or dive among other swimmers in deep, clear, obstruction-free water, then fail

He wastes no time in having Maggie "strip!"

Maj Mason guides crane operator lowering giant thermometer into water.

"Br-r-r-r!" Maggie seems to be saying, "the water is much too cold for a lady to go swimming—even a robot."

to surface – until his lifeless body is recovered? Both of these examples are real and typical of the two most common causes of drowning – causes whose significance was not fully realized until the completion of a study in FY 1976.

That's what this film is all about – the two deadliest hazards to swimmers. They go by the technical-sounding

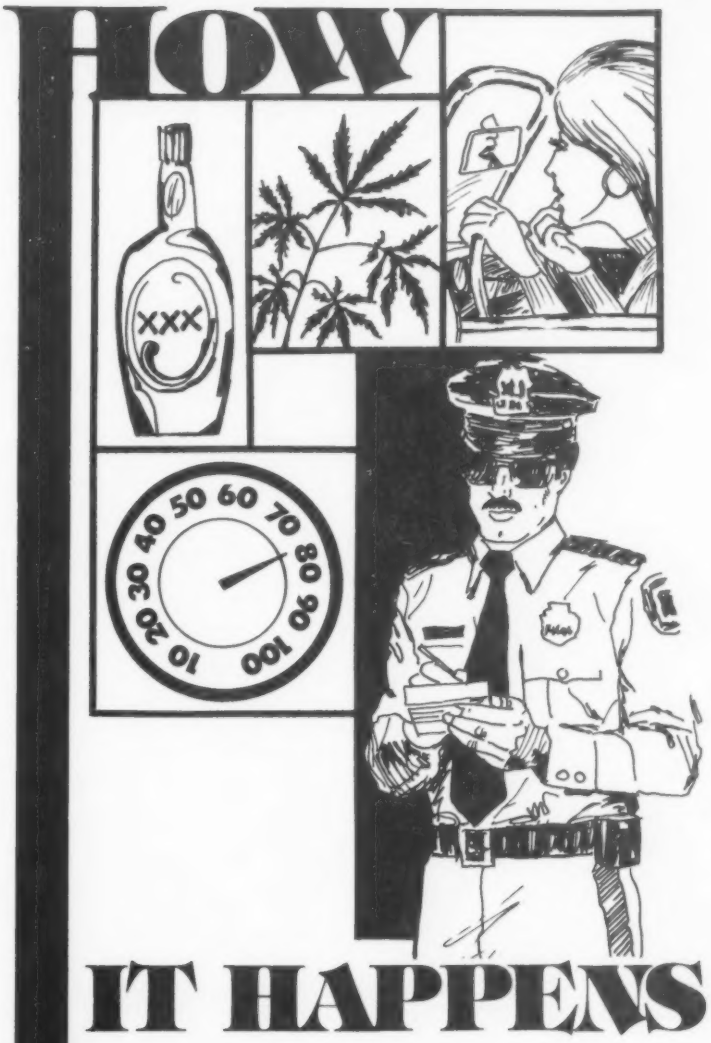
But Marty dutifully obeys the command "to step into the water," and does so about as gracefully as any robot.

names of generalized hypothermia and reflexive compulsive hyperventilation. But don't let the labels fool you. They are both simple processes easily understood; and "Drowning: The Cold Facts," a film you will find to be entertaining and eye-opening, does a superb job of explaining them. It also answers other questions such as how a single drink of any alcoholic beverage while swimming can be dangerous.

This film is part of an all-out water safety campaign that will include posters and Armed Forces Network television spots. This concerted effort is the result of a pilot water safety program conducted in FY 1977 following the drastic FY 1976 rise in drownings among Army personnel. The initial campaign was highly successful; drownings in FY 1977 decreased a full 40% from those of the preceding year.

Join in this new campaign and take ten minutes – the proposed running time of the film – and enjoy this movie. You'll want to share the lifesaving information with everyone.

(left)
As the cameraman can attest, the robots aren't the only ones to get wet.



IT HAPPENS

Seaman Greg Arious is on liberty, touring the town in his girlfriend's father's car, with her wedged tightly under his right arm. After a trip to the city park for some birdwatching and related activities, they are on their way to an afternoon matinee, and more related activities. Cruising down a boulevard, with her sitting a bit close, he sideswipes a station wagon. Damage to his girlfriend's father's car is considerable.

Seaman Arious should:

1. Throw himself on her father's mercy.
2. Join the Foreign Legion.
3. Become a monk.
4. Drive with both hands on the wheel, his eyes on the road, and the girl belted-in securely on the other side of the car.
5. Neck only at stoplights.

Sorry, number 4 is the only one we'll buy. An automobile (at least a *moving* one) is no place for that kind of activity. Inattentiveness to driving is a dangerous practice.

Here's a dandy way to give your moped suspension a work-out. Mopeds are designed for use on smooth surfaces.

Opinions on mopeds seem to vary. "They're as safe as you make them yourself. You have to have a good riding attitude," said one rider we know. Another said, "They're convenient and easy to park. And I get a lot of fun out of mine."

Another person we know had a slightly less charitable view of mopeds: "They should be outlawed. They go too fast and they're not safe. I can think of all sorts of good uses for them: They make good paperweights and good anchors for boats. They're good for exercise – just push one from the front yard to the back yard. They can be used interchangeably with rocks – like for yard decorations and as pets. And you can use crushed mopeds – that's the way I like 'em best, crushed – for paving your driveway."

DRIVER has gone into mopeds before, but maybe it's time to mention them again, because these little vehicles are gaining more popularity all the time. Some of you loyal DRIVER readers may want to buy them before long. A lot of you already have.

There are many more dealers who sell them now, some who sell them exclusively. You often hear advertisements on the radio, and fewer people make fun of them when they realize the economy of the moped. Even our advocate of "pet mopeds" was willing to be convinced.

Basic Anatomy: Maybe you haven't seen one yet. If you haven't, here's what to expect. A moped is a cross between a bicycle and a motorcycle. It has pedals like a bike, and it has a motor like a cycle – therefore the name "MOped."

Generally, mopeds have a motor and a gas tank built onto the frame. They have a battery, a muffler, shock absorbers and other things just like a motorcycle. And they have those pedals, ***unlike*** a motorcycle. The pedals aid the rider in getting the moped going, and they are used on uphill grades that are too steep for the motor alone to conquer.

Before we go any further, a couple of ground rules: First, this is not meant to be an all-encompassing article on mopeds. This is just to make you aware of them, if you aren't already, and to give you a few facts that may cone in handy if you decide to purchase one. There will be individual differences

between manufacturers, and you should check with the dealer on the characteristics of the particular one you look at.

Second, in this discussion, we will deal only with mopeds, the vehicles in which the rear wheel is chain-driven by the motor, and not with the other hybrid, motorized bicycles. The latter are simply bicycles with a motor attached to the frame at the fork. The motor, when engaged, has a roller that turns the front wheel of the bike. It makes a slow-moving contraption, about 17 mph, tops. And the motor can only be used on level ground, not on uphill grades. Mopeds are much more common in American than the motorized bicycles, which are popular in Europe.

Powers and Abilities Far Below . . . The first time I saw a moped, a few years ago, I was driving through a suburban area. I had just pulled onto the side road at a "T" intersection when the moped turned out onto the main road. The rider pumped the pedals a few strokes and then continued on, propelled by a motor that sounded less powerful than dad's old 1954 power mower.

In point of fact, it probably *was* less powerful. Mopeds are not high-powered machines, nor are they meant to be. They are designed to get the rider from point A to point B with the minimum of wear on the feet, and the wallet.

That last advantage, economy, is probably their greatest selling point. The little mopeds can get you 100, maybe 150 miles on a gallon of gasoline.

And with that kind of mileage, you can expect that they are marshmallows and will not make you the "terror of Highway 101." Even if they allowed mopeds on highways, which they don't.

That brings to mind a very important fact: these things are not motorcycles. They are small, and low-powered. If you want the speed and power of a motorcycle, get a motorcycle. Don't buy a moped and try to drive it as you would a cycle. You'll be disappointed in the performance, and you'll likely destroy the little thing.

If, however, you want a relatively inexpensive, economical means of getting you to work, this may be the answer.

Yes, *relatively* inexpensive. Mopeds range from around $300 to $500 or so, depending on what you buy and what's on it. That's quite a bit more than a bicycle, but of course a lot less than the number-one best-seller, the automobile.

Moped riders are hailing the little vehicles as a convenient, easy–and fun–way to travel

Speed and Other Limits: There are some definite limitations to the moped mode of transportation, and we'd best deal with them. They could affect your decision if you're looking at them.

First, as we've mentioned, they are not as large nor as powerful as motorcycles. The little two-stroke motor is usually about 50 cubic centimeters, and generates about two horsepower. Mopeds have a top speed of around 30 miles per hour. Not the kind of thing land speed records are made of.

Also, they are not trail bikes. Mopeds are made only for on-road operation. They are low-slung and the suspension is not designed for rough surfaces.

And while we're on suspension, remember that they are for one rider only. The suspension will not react well to the weight of two people. Along with this, a moped is not made for hauling heavy loads, either. They are designed to get one person and *minimal* baggage from one spot to another.

But 140 MPG?!? Mopeds and motorized bicycles have been around for a lot longer than most Americans realize. They became popular in Europe after World War II as a cheap and efficient means of getting around. An officer at Norton AFB, where DRIVER is located, remembers seeing mopeds in Bermuda in the 1960s.

"The squadron commander wouldn't allow the aircrews to ride them," he says. "People were riding them pretty fast on the beach and he thought they were dangerous."

That is a debatable point, but it is true that they get more common every day, so they can't be ignored.

Why buy one? "The main thing is 140 miles per gallon," said one moped rider at Norton. "And with the good weather we have in California, it's hard to pass up." (Another owner was unconcerned about the weather. He wears a special rain suit when he rides his moped in bad weather.)

Both men agreed that riding a moped requires that the rider be extra careful. "You're in a guy's blind spot with this kind of vehicle," said one. "You ride on the right side of the road, and they don't see you. You have to be super defensive."

The riders agreed that driving at intersections on a moped is the most dangerous situation. One complained of drivers from the opposite direction making a left in front of him. "They don't seem to see you," he said.

The motorcycle rider's old complaint of being "the invisible man" is equally applicable to the moped rider. So what do you, as the new moped rider, do to remedy that problem? Obviously, you make yourself as visible as possible. That means wearing white clothing at night, and bright-colored clothing during the day. Reflective tape is always a good idea. And make use of the headlight.

Remember, even though you have a motor you're more vulnerable than the motorcyclist because you have neither

continued

the speed nor the maneuverability of the cycle. So drive "super defensively," like the man said. Allow more space between yourself and the traffic around you. Always behave as though the car drivers have not seen you – you could be right.

Know The Beast: Our main interest, of course, is that you drive safely, whatever you drive. Be aware of what you're riding: A moped is *not* a bicycle. It is more complex and the precautions you need to take are more complex.

The basics are the same: Don't ride two abreast on the road. Go slowly when riding in high winds. Don't swing in and out between cars in traffic. Be very careful at intersections. Give yourself plenty of room in case you're in an auto driver's blind spot. Slow down at night.

But the moped is also a motor vehicle. You should be very familiar with the controls of your moped before you venture into traffic, even sparse traffic. Practice riding on residential roads and memorize the position of the engine stop switch and the fuel shut-off valve.

The throttle of the moped is in the right-hand grip and works like that of

(above)
(top) **At a railroad crossing,** the rider should attempt to cross the tracks at a 90-degree angle. (middle, left) **The usual two-stroke engine** on the moped will run on a mix of gasoline and two-stroke oil. Don't try to run it on straight gasoline. (middle, right) **A moped** has a very narrow profile, so the rider should do everything he can to be highly visible, like wearing bright-colored clothes and helmet. And he should always signal his intentions, as this guy is doing. (bottom) **Here's that** little fuel valve. If this is in the off position, don't expect the engine to run.

a motorcycle. There will usually be an engine stop switch on the moped, which can be used in an emergency to shut off the motor. Mopeds also have fuel valves that control the flow of gasoline to the motor.

A moped will require more maintenance than a bicycle – after all, there's that little motor. You should be prepared to handle minor work yourself; the owner's manual, and the dealer, can teach you how to maintain the moped. The bigger jobs should be left for a qualified mechanic.

Keep the proper pressure in the tires. The moped will probably come equipped with a bike pump. If not, be *very* careful in using the compressed air at service stations; moped tires overinflate easily. And know how to repair a flat!

Watch the spokes, too. Tighten any loose ones, or ask the dealer to do it for you. Loose spokes will adversely affect handling.

Sounds like a bicycle? Well, remember the motor. You should be able to tune the engine, and adjust the chain-drive.

Your moped may come with a tool kit. Keep that with you, as well as replacement light bulbs, a can of oil, and maybe a spark plug.

How-To Section: Now just a few assorted pointers: You should keep your feet on the pedals at all times to prevent them from turning when the motor is in operation. Also, keep the pedals horizontal to the pavement. This will keep them from scraping on the road when you make a turn.

In low speed turns, simply turn the handlebars in the proper direction and go. In higher speed turns, you must lean into the turn. If you don't, you'll spill over in the opposite direction. It's just a matter of feel, like on any two-wheeled vehicle. Until you get the hang of maneuvering it, keep your speed down on the moped.

How about some braking how-to's? It's always nice to know how to stop a vehicle. The rear brake is on the left handlebar, the front brake is on the right. When moving slowly, like at a walking pace, use the rear brake. At all other times, use both front and rear brakes. For sudden stops, apply the rear brake first, and then the front. This will maintain the stability of the moped. Don't be afraid of the front brake; that's where most of the braking power is.

When you are heading for a turn, apply the brakes *before* you get to the turn, so that you're slowed sufficiently to make it confortably. If you enter a turn too fast, apply the brakes lightly.

When slowing or stopping in wet weather, apply both brakes evenly and pump them lightly if necessary.

Another thing: When starting the moped on its kickstand, hold the rear (left) brake to stop the moped from taking off before you're ready.

Use the standard hand signals for any maneuvers – left arm up for right turns, straight out at the side for left turns, and down for slowing or stopping.

Here are a few special things to watch out for:

- **Rough roads.** These will play heck with your suspension, as will rubbish, branches, and things like that on the road.
- **Left turns.** These are hazardous in any low-powered vehicle. Instead of using the left turn lane, you might stay on the right side through the intersection, turn your moped and walk it through at a 90-degree angle. As always, when in doubt, play it on the safe side.
- **Railroad tracks.** Same problem as rough roads. Always try to cross railroad tracks at a right angle, or close to it.

continued

Intersections are trouble-spots on a moped. Car drivers can often make a right turn in front of the moped rider, without even seeing him. By the way, we wish this guy had a helmet, for his own protection.

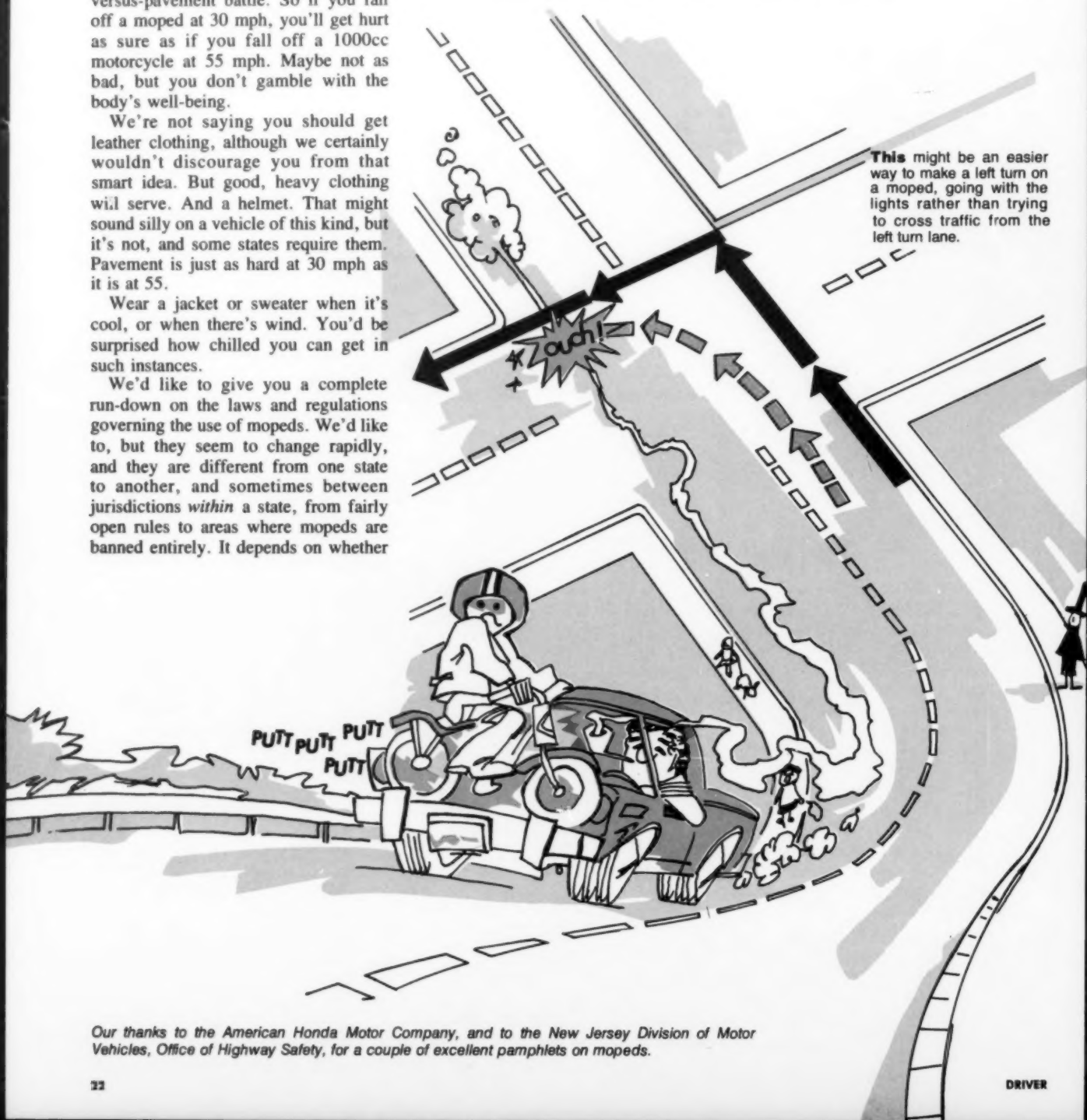
What To Wear: You knew we'd get to it sooner of later. You *can*, of course, wear anything you like while riding a moped, from swimtrunks to a suit of armor. We at DRIVER lean a little more toward the armor, except for the weight. But you get the idea. Asphalt and cement usually win any body-versus-pavement battle. So if you fall off a moped at 30 mph, you'll get hurt as sure as if you fall off a 1000cc motorcycle at 55 mph. Maybe not as bad, but you don't gamble with the body's well-being.

We're not saying you should get leather clothing, although we certainly wouldn't discourage you from that smart idea. But good, heavy clothing will serve. And a helmet. That might sound silly on a vehicle of this kind, but it's not, and some states require them. Pavement is just as hard at 30 mph as it is at 55.

Wear a jacket or sweater when it's cool, or when there's wind. You'd be surprised how chilled you can get in such instances.

We'd like to give you a complete run-down on the laws and regulations governing the use of mopeds. We'd like to, but they seem to change rapidly, and they are different from one state to another, and sometimes between jurisdictions *within* a state, from fairly open rules to areas where mopeds are banned entirely. It depends on whether "moped" fits their legal definition of "motor vehicle" or "bicycle." There will be different limits for engine displacement, maximum speed attainable and maximum horsepower, and many states have a minimum age for riders. So check with local authorities on requirements for license, registration, insurance, safety equipment and so forth.

We hope this has cleared up a few questions on an increasingly popular means of transportation. Any detailed or specific questions should be aimed at the friendly local moped dealer. Happy soft-pedaling!



This might be an easier way to make a left turn on a moped, going with the lights rather than trying to cross traffic from the left turn lane.

Our thanks to the American Honda Motor Company, and to the New Jersey Division of Motor Vehicles, Office of Highway Safety, for a couple of excellent pamphlets on mopeds.

Dirt Biker a WINNER at 15

The 1977 Grand National Motocross Champion, Central Region, 125cc intermediate class, is just 15 years old! He's Robert K. Murdoch, son of Lt Col Robert F. Murdoch, assistant operations officer for flight crews, 963d Airborne Warning and Control Squadron, Tinker AFB, Okla.

On a brisk afternoon last fall, Robert sped to victory at the Oklahoma City Raceway. Robert competes in the Intermediate class for experienced riders who've survived the Novice class and are training for the Expert class. He rides a 125cc, 1978 Husqvarna, or "Husky," built in Sweden.

"Japanese bikes dominate U.S. racing," says Robert, "but we picked the 'Husky' because of its durability. It costs 50 percent more than comparable Japanese models, and it's 15 pounds heavier. But its engine delivers more usable power, its suspension system provides more 'travel,' and its frame is tubular chrome-molybdenum steel." Also, the bike is one of only two racing cycles in the world to offer an unconditional 90-day warranty.

Robert's successful racing career is solid evidence he's concerned for safety. On really rough tracks he wears a kidney belt, a nylon and elastic supporter with Velcro snaps. And he always wears heavy leathers which include knee cups and hip pads, plus shoulder pads and a thick nylon jersey. Even his boots are padded around the ankles and have steel toes.

Safety also includes a pre-race inspection. Spokes are tightened, chain tension-checked, tire pressure checked, and front and rear brakes and clutch adjusted. And the entire engine is torn down to check for wear.

But Robert's big edge in winning consistently is his "wrench" or "tunner," racing jargon for one's mechanic. And Robert thinks he has the best – his dad. A mechanic by hobby, Lt Col Murdoch saves the family a lot of money by doing most repairs himself. He knows important races can be won or lost by such seemingly small maintenance adjustments as changing carburetor jets to accommodate changes in altitute or air temperature.

Besides safety and a fine "tuner," Robert has two other secrets to winning the championship – physical conditioning and concentration. Motocross is such a physically punishing sport that the Husqvarna owner's manual includes a complete physical conditioning program. And a recent medical survey, quoted in the 1977 motocross Grand National Champion Program, shows Motocross racing to be the most physically demanding sport in the world, except for soccer. Pro football ranked eighth!

"And don't forget concentration!" says Robert. "It helps block out the noise and dust of so many bikes 'smoking it' over 'stutter bumps' and 'whoop-de-doos'." Translated from race track jargon, that means so many riders driving aggressively at full speed over dirt bumps built up on hard braking turns, and over hills and valleys caused by bouncing bikes accelerating after a jump.

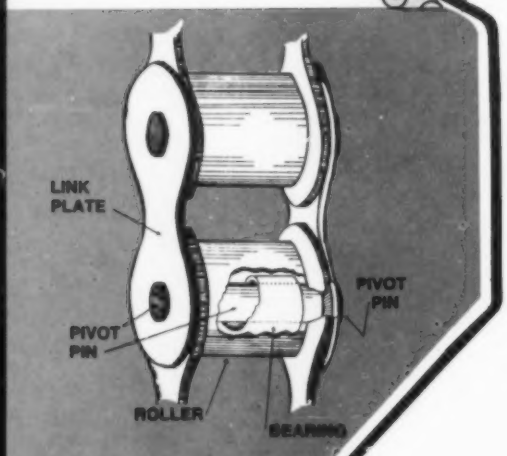
"Concentration also means no kid stuff, like wheelies," according to Robert. "Wheelies are for show and will cost you a race, because you have to decelerate to bring the front wheel back down!" Finally, being 15, Robert is not yet distracted by "pit tootsies," those attractive ladies who follow motorcycle riders from race to race.

Robert's family is very proud of his winning 38 trophies in 1½ years. More than that, he's a 4.0 student at Central Mid High School, Moore, Okla. "Robert has his priorities straight," said Lt Col Murdoch. "He's very interested in attending the Air Force Academy!"

In March, Robert represented Oklahoma, Iowa, Kansas, Arkansas, Missouri and Wyoming as the Central Region Champ at the Houston Astrodome. There were some rough pile-ups on the course that kept Robert from showing his winning form, but he wasn't involved. He has meanwhile moved into the Expert class and DRIVER will be keeping an eye on him.

Winning 38 trophies in 18 months, 15-year-old Robert proved his ability to compete with older, more experienced racers. The 5-foot trophy in the center of his collection was carried home 27 Nov 1977 when he became Grand National Champion, Central Region, 125cc intermediate class.

MOTORCYCLE Drive Chain Care



Cutaway drawing of internal construction of a conventional (non-self-lubricating) chain link. *(By Carol Shuster)*

If you've ever had the misfortune of throwing a chain, be it out in the desert, back in the woods, or just before that last berm in that first motocross you had a good chance of winning, then you probably don't need to be told about the importance of proper chain care. But even street riders should guard against chain failure. Throwing a chain on the highway can ruin a beautiful weekend trip or even worse, damage expensive engine cases and sprockets. It also represents a very real hazard to rider and passenger since a broken chain can do bad things to feet and ankles.

It's a safe bet to say a modern bike's drive chain is the weakest link in the power train. When you consider the job it's been asked to do – often under miserable working conditions like water, dirt, grit and lack of lubrication – it's a small wonder that the chain does its job so well.

I'd like to give you some pointers on how to make life easier on your bike's drive chain as well as on your wallet. While DRIVER normally agrees with recommended service procedures, proper chain care is clouded in controversy. The important thing to remember about chain care is: just about any type of periodic chain care is better than none at all.

If you motorcycle drivers with the shafties are still with us, you are excused – but only after checking the oil levels in your final drives.

Required Tools: Most new motorcycles are equipped with small tool kits which usually contain the tools needed to adjust your bike's drive chain. Always carry this tool kit on the bike as chain adjustments often can't wait until you're back home or near the Hobby Shop. If your bike doesn't have a tool kit, then the first tools you'll want to invest in are *open-end wrenches* for the rear wheel axle nut, chain adjuster nut and brake anchor plate nuts. Sizes vary, so check your bike's requirements before shelling out hard-earned cash for a wrench that won't fit.

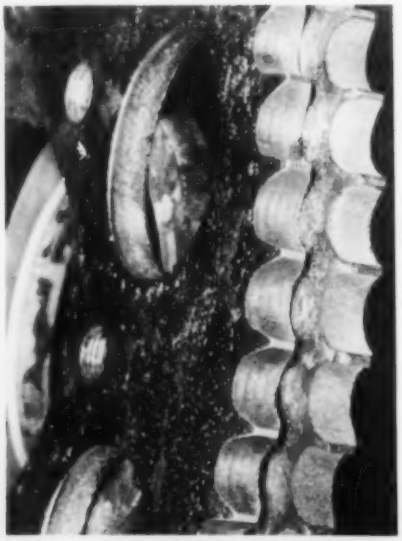
Another "tool" you'll want to carry along is a 12 to 15 foot long piece of string, which is used to determine correct wheel alignment and maximum chain tension. The string is also handy for securing your wrenches or tool kit when they are carried on the bike.

You may also want to get a motorcycle tie-down strap, although an extra pair of hands belonging to a good friend will suffice. Have a clean rag nearby, as well as your favorite brand of chain lubricant.

Also, have your owner's manual handy whenever you perform maintenance. You might even consider purchasing the appropriate workshop manual for your bike. These manuals are available from most dealers.

CHECKING FOR WEAR

Sprockets. Before you begin to check the chain for excessive wear, inspect the sprockets for damage and wear. Worn sprockets will ruin an expensive new chain in no time. Be sure to check both the countershaft (gearbox) sprocket as well as the larger rear wheel sprocket. Some slight, even, cupping of the sprocket teeth is inevitable, but severe cupping means it's time for new sprockets.

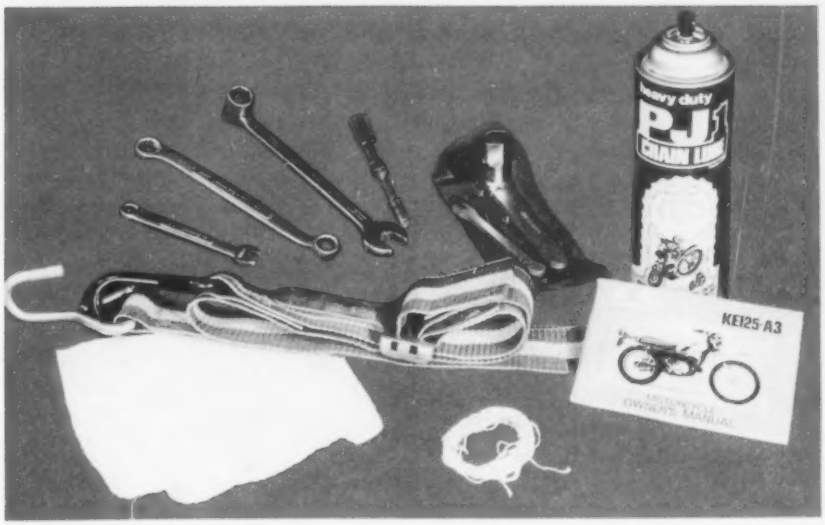


New sprocket (foreground) vs. worn sprocket (top or rear). Note: Worn sprocket has much blunter and wider teeth. Also, slight cupping has occurred.

Required reading for the chain gang

by LEE K. SHUSTER

photos by DAVID H. POLCYN



Required tools: Owner's manual, chain lubricant, string (10 to 15 ft), rag, tool kit, open-end wrenches and motorcycle tie-down strap.

Chain. To check the chain for wear simply grasp one link at the rear of the wheel sprocket and pull it with your thumb and forefinger. If the chain link is loose enough to expose most of one sprocket tooth, you should probably remove the chain and measure it for wear.

Chain Removal. Before removing the chain, you should check to see if your bike has a concealed countershaft sprocket. If the countershaft sprocket is not clearly accessible, here's a tip that will save you a lot of trouble when it comes time to reinstall the chain. First, get an old piece of chain (of matching pitch and width) about two to three feet long and connect the old chain to the end of the chain being removed. With the gearbox in neutral, carefully draw the dummy chain around the counter shaft sprocket and leave it until the original chain is reinstalled. *Note:* When reinstalling the chain, insure that the master link retaining clip is pointing in the direction of forward chain travel. Now disconnect the original chain and remove it for measuring.

Measuring Chain Wear: Chain wear usually occurs as the *rollers* and *pivot pins* become elongated (see illustration). This causes the chain to stretch. The amount of stretch should generally not exceed 2 percent. To measure stretch, place the chain on a flat surface and measure it from tip to tip, first fully compressed and then fully stretched. (To compute the maximum allowance, multiply the compressed length by 1.02; the result is the maximum allowable stretched length.) For example, if you measure the compressed chain to be 60 inches long, then the maximum allowable stretched length would be 61¼ inches. Replace any chain which has stretched beyond the 2 percent allowance. A stretched chain will not only cause the sprockets to wear faster, but it will eventually break with the possibility of expensive (and dangerous) engine case or sprocket damage.

Lubricating Chains: At this point you're probably wondering why your chain stretched out and died after such a short life. The key to longer chain life is lubrication. Your engine won't live long without oil and neither will your chain. Use one of the aerosol penetrating lubricants frequently. But if your bike is equipped with a "self-lubricating" chain, follow your owner's manual instructions.

To lube the chain, place the bike on its centerstand with the engine off and the gearbox in neutral, and spin the rear wheel by hand. Then spray each side of the chain between the *link plates*. On the street bikes it's best to do this after a ride so the lubricant can have time to penetrate the *roller pivots*. If you lubricate just before riding, you're likely to fling oil everywhere. Needless to say, oil on your rear tire is an invitation to disaster.

Chain Cleaning Myths: Most manufacturers recommend removing the chain and soaking it in solvent to thoroughly remove the dirt and old lubricant. Then most manuals recommend relubricating and installing the chain.

Removing the exterior crud is OK, but when you soak a chain in solvent it usually dissolves the protective lubricant that you have been faithfully apply-

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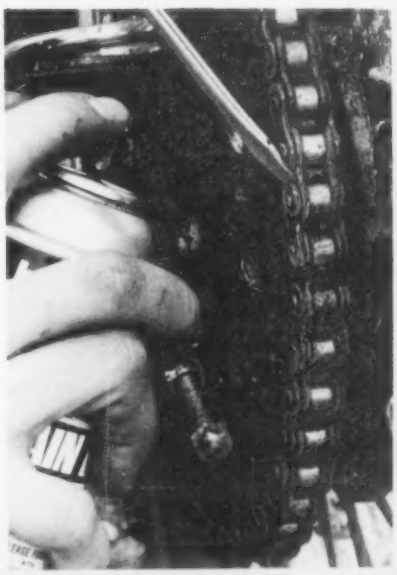
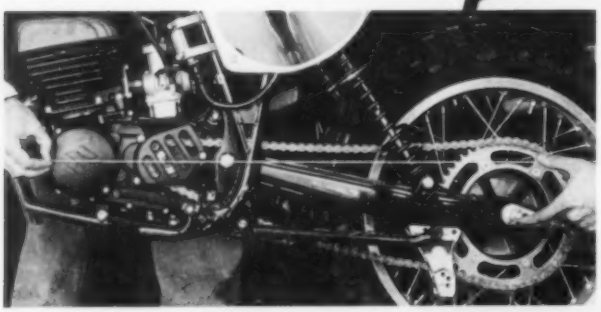


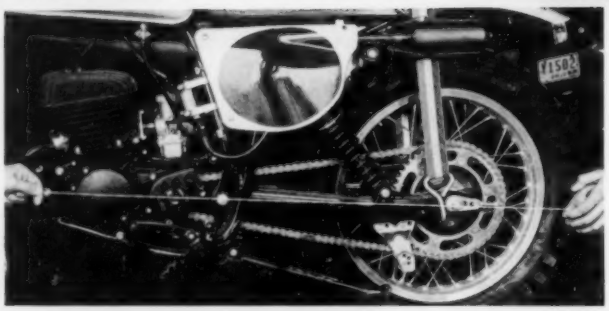
Lubricating chain with aerosol. Screwdriver tip points to space between link plates where lubricant should be applied. Both sides should be lubricated at this point.

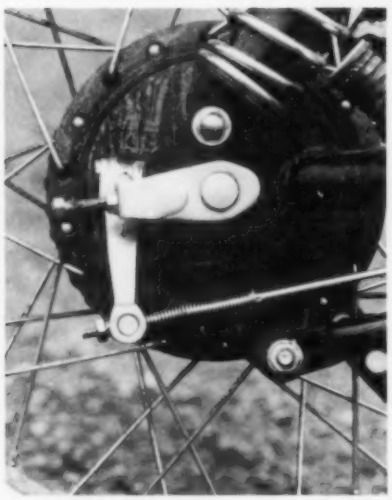
Proper alignment of rear wheel using the string sighting method.

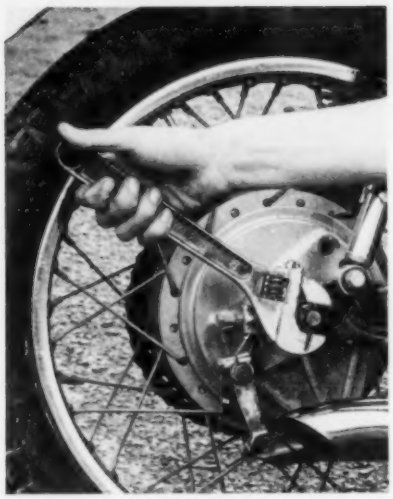


Countershaft sprocket, swing arm pivot and rear wheel axle are not in line when bike sits at rest, consequently chain is not at tightest point. String indicates how far swing arm must travel to reach tightest point.

(right)
Swing arm has been compressed using tie-down strap. Rear axle is now in-line with countershaft sprocket and swing arm pivot. Chain is now at tightest point. Note; Chain is visibly tighter in this photo than in previous photo.







(left) **Brake anchor plate bolt** and arm located at 5 o'clock. Brake adjuster nut located at 7 o'clock. Wheel and chain adjustment bolt located 9 o'clock. (right) **Make a point** to leave the top of the adjuster nut or bolt in a horizontal position as shown. This makes it easier to count turns when going from side to side. Make sure to loosen the locking nut before trying to adjust the bolt, otherwise you're likely to strip the adjuster mechanism.

Always tighten the axle nut by pulling forward. This prevents the axle from accidentally shifting, producing misalignment.

ing. This allows the abrasive particles to enter the insides of the chain *rollers*. So, although the outside of the chain looks cleaner, the inside is actually dirtier. Once the tiny abrasive particles enter the *bearing surfaces*, it's almost impossible to remove them. Thus more harm than good is accomplished and chain life is decreased.

Recommended Cleaning Procedure: A better way to clean your chain (this applies to either street or dirt bikes) is to first remove the large dirt deposits with a brush. Then wipe the chain with a clean oil-dampened cloth. Finish the job with a liberal application of spray-on lubricant as mentioned earlier. This process is easier than the mythical "remove and soak" process and should be performed more frequently. Periodic applications of lubricant will build up a protective layer and prevent most of the dirt and crud from entering the insides of the chain, and thus prolong chain life.

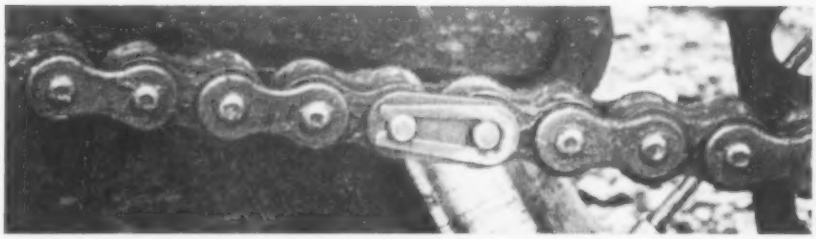
Wheel Alignment Myths: Proper wheel alignment is essential to allow a motorcycle to have good tracking and handling qualities. DRIVER stresses the importance of proper wheel alignment not only for safety's sake but also because proper alignment promotes longer chain, sprocket, and tire wear.

Many motorcycle manufacturers provide index marks or "hash" marks to facilitate chain and rear wheel alignment. These marks are usually located behind the rear axle as part of the chain adjuster assembly. In theory, correct wheel alignment will occur when both the left and right adjusters are set on equal alignment marks. This may be true for some bikes, but frequently it results in gross misalignment of the rear wheel.

Several motorcycle manuals recommend aligning the rear wheel in this fashion, but don't trust the "hash" mark method. There may be a better way.

DRIVER suggests the wheel alignment be checked each time the chain is adjusted.

Recommended Wheel Alignment Procedure: First place the bike on its centerstand with the front wheel pointed straight ahead. Using a long string (12 to 15 ft), tie the string onto a spoke of the front wheel, near the ground, and towards the front of the wheel. Pull the string around the front of the tire and then to the rear. Be sure the front wheel stays pointed straight ahead. While kneeling close to the ground, several feet behind the bike, pull gently on the string so that it is resting along the sidewalls of both front and rear tires. Adjust the rear tire so that it is evenly framed in your line of sight with the front wheel by the string. Repeat this sighting with the string on the opposite side of the wheels to recheck your alignment.



Always install master link retaining clip pointing in direction of forward chain travel.

Chain Adjustment Intervals: How often should you adjust the chain? Frequent small adjustments are far better than fewer large takeups. Many touring riders travel hundreds of miles in a day without requiring an adjustment, while motocrossers using long travel suspensions in competition often adjust chains after a single heat. For the average commuter, once-a-week adjustments may be the answer. Your particular riding habits will dictate your adjustment intervals. One safe ruls is: When in doubt—*ADJUST*.

Determining Proper Chain Tensions: The first step in determining the proper chain tension is to locate the center of the swing arm arc. This is necessary because the swing arm suspension found on most modern motorcycles varies the chain tension between each extremity of the suspension travel. The chain is tightest at the centerpoint of the arc and looser at each end of the arc. It is important to check the chain tension at its tightest point to avoid overtightening and stretching the chain.

The chain will be at its tightest point when the centers of the rear axle, swing arm pivot and countershaft sprockets are in line. To determine your chain's tightest point, try this: Hold a piece of string across the centers of the countershaft sprocket and swing arm pivot. Then extend the string rearward in a straight line to indicate where the axle should be to achieve maximum chain tension.

On most bikes you'll need to compress the rear suspension to find the point of tightest chain tension. For this you may want to use a muscular friend or a motorcycle tie-down strap.

Having compressed the suspension to the chain's tightest point, you are now ready to check the chain for "free play." Free play is the total up and down movement of the chain. For street bikes one-half inch free play is recommended, while dirt bikes need three-quarters inch free play.

Chain Adjustment Procedure: Now that you've determined your chain is in need of adjustment, here's how to do it:

1. Loosen the brake cable or brake rod adjuster found near the rear of the cable or rod, next to the rear brake arm.

2. Loosen the brake backing plate anchor bolt. This prevents damaging the plate. The backing plate anchor is usually an arm attached to the swing arm which prevents the backing plate from turning when the brakes are applied.

3. Loosen the axle nut by pulling your wrench to the rear of the bike.

4. Loosen the adjuster locknuts. Turn the adjuster bolts located at each axle end. It's a good idea to bump the wheel since this firmly seats it against the adjuster stops. By leaving the top of each adjuster bolt in a horizontal position, you can count an equal number of turns for each adjuster bolt, to

continued

maintain proper wheel alignment. Check chain free play to assure proper tension. Using the string, check rear wheel for proper alignment. Don't forget to tighten the adjuster locknuts, after you've found the proper alignment.

5. Tighten axle nut carefully, pulling wrench to the front of the bike. This helps to seat the axle against the stops and is less likely to disturb your wheel alignment and chain tension adjustments.

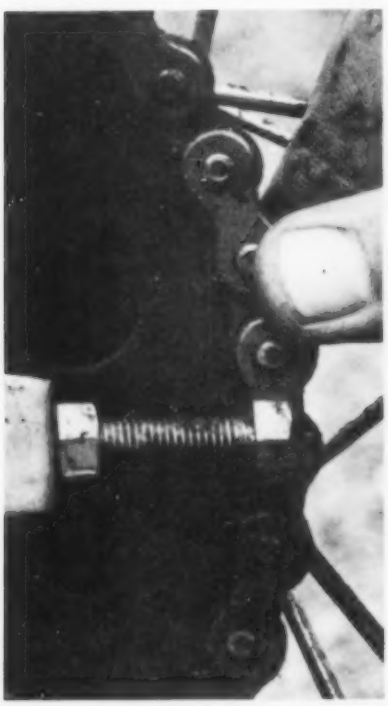
6. Recheck the rear wheel alignment, again using the string procedure. It is very easy to disturb this adjustment on the previous step, so it's better to catch it now than when you're wobbling through that tight bend or curve in the road.

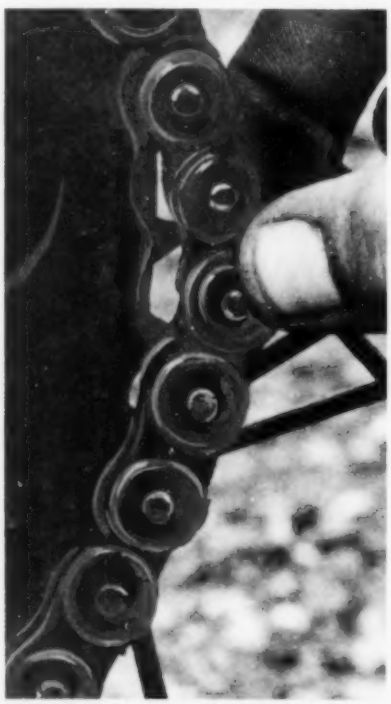
7. Before tightening the backing plate anchor bolt, you should push the bike forward and slam on the rear brakes, holding them on until the backing plate anchor bolt is tightened. This will require the help of a friend, but it insures that components seat properly and that rear brake action and feel is not disturbed.

8. Tighten and adjust the rear brake cable or rod for the correct amount of free play at the brake pedal (usually one-half inch or less).

If you've stayed with me this far, congratulations. I hope I've cleared up some of the myths about chain care and adjustments. If all this seems rather drawn out and complicated to you at this point, go through it one more time and follow each step closely. In the long run the few minutes spent caring for your bike's chain will be well worth the peace of mind gained from preventing potential problems before they occur.

Special thanks to Athens Sports Center, Athens, Ohio.





(left) **Checking** chain and sprocket for wear. This is a chain with little or no wear. When the chain is pulled away from the sprocket very little sprocket tooth is exposed. Contrast this with the next photo. (right) **Checking** for chain and sprocket wear. When pulling the chain away from the sprocket, much of the sprocket tooth is exposed. This cannot be corrected by increasing chain tension. This bike needs a new chain and two new sprockets.

Backfire
LETTERS to the EDITOR

AIR BAGS

Your article on air bags (Feb '78) was interesting, but I am afraid that the government has stepped on it again. I am very much in favor of the double protection afforded by the air bag and feel that the consumer who does desire this should be able to special order it. To impose this double protection on all car buyers is another case of government meddling.

Even with air bags, seat belts are still required to help retain motorists in the car. A comparison between the protection provided by the double protection (bag and belt) against the belts alone would reveal little differences between the two systems. The comparison of the costs between the two systems is markedly different. The American public is going to protest.

I suggest adoption of a passive belt system similar to that in the VW Rabbit. The cost would be minimal, but the protection afforded would be approximately the same as the double protection. The belts we have now work when they are used. A passive system would remove the human element.

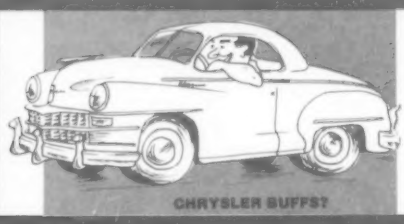
Mr. Fred W. Young
USA Safety Specialist
5939 Windsor Drive
Columbus, GA 31904

I found your article on the Air Bag demonstration in the Feb '78 issue very interesting; however, there are some problems with the system that raise serious questions as to the cost/benefit ratio.

The object of any passenger restraint device is to decelerate the human body at a rate below that which will cause death-producing trauma as well as to retain the passenger in the vehicle. The air bag provides this during head-on collisions for the first impact but provides restraint to a lesser amount as crash forces are moved from the head-on position to the side of the vehicle. The air bag provides no restraint for second collisions or roll over, thus the driver who hits a bridge abutment then enters the path of an oncoming car has no protection. A good three-point suspension system provides this protection.

When a human body is decelerated, the restraint system must dissipate the kinetic energy developed by that body.

THE PRICE OF MARIJUANA



CHRYSLER BUFFS?

One of the facts discovered by Calspan Corporation, who have done much research in this area, is that if an air bag will restrain a body at 30 to 40 mph it is useless at 50 to 60 mph. It doesn't inflate fast enough for the higher speed and it inflates to a pressure that is overcome by the force of the body being thrown forward. In other words, a 40 mph bag doesn't protect at 50 to 60 mph. On the other hand, when a bag is designed for the higher speed it must inflate so rapidly and to such a high pressure that it's like hitting a brick wall when the human body hits it at lower speeds.

Calspan has developed a two-stage system that uses a crushable instrument panel/shock absorber combination for the lower speeds and uses a combination of the panel and bag for higher speed. They also found that the restraint works best when the passenger is facing directly forward so this instrument panel protrudes well over the seat so the passenger can't turn sideways. Calspan also discovered that to properly restrain the body it was necessary to design a foot well into the front to retain feet and legs in the proper position. Our present air bags are sorely lacking when measured against this research.

In my opinion the best total solution discovered thus far is the Air Belt which is a safety belt with a built-in air bag on the chest strap that will distribute the forces over a wider area in the event of a crash. This device seems to incorporate the best of both worlds, as it also reacts to the secondary impact as well as rollovers. I congratulate the people at Keesler for their innovative educational ideas but believe that the Air Bag car does not tell it like it really is.

Mr. Donald B. Williams, USAF
Ground Safety Manager
351 SMW
Whiteman AFB, MO 65305

We are hoping to visit Calspan soon so we can report on the many interesting things they are doing regarding vehicle safety. Frankly, we had never heard that the air bag doesn't inflate fast enough at speeds above 50 mph. The shoulder/lap harness does offer the best protection in many crash situations but *people still won't use them.*

CHRYSLER BUFFS?

I truly enjoyed your article "Declaring Independence from a Dealer" in the Feb '78 issue of DRIVER. I have been a car nut ever since I can remember and at this time I'm using a 1954 Chrysler New Yorker for the family transportation. It is about 80% restored.

Even though El Paso is a fairly large city, parts are rare and sometimes very costly. Your article was very helpful in giving me methods in which I can locate needed items, other than spending all my free time wandering around in junk yards.

How about some more stories about American cars of special interest such as mine? I would also like to hear from other people who love and drive old Chryslers, in order to exchange ideas and knowledge.

SSG Larry K. Simmon, Sr., USA
B Btry S&F Bn
Fort Bliss, TX 79916

THE PRICE OF MARIJUANA

I have just finished reading the column, "Drunk or Stoned or Both," in the Jan '78 issue of DRIVER.

The following story is true, and based on a personal experience.

On 18 May '72 our daughter received her Bachelor's Degree from Drake University, in Des Moines, Iowa. She planned to remain in Des Moines for the summer and work on a living history farm, plus do some post graduate work at Drake in preparation for her Master's Degree. She was to start work on June 5th. On 4 June at 12:04 a.m. her dreams for the summer, and for months to come, were smashed along with her young body. She regained consciousness four days later to face the loss of her right eye, right arm broken in three places, index finger broken, right thumb and bones in the back of her right hand dislocated, left jaw dislocated, left leg broken with two inches of the femur (large thigh bone) missing, and almost every inch of her body badly cut or bruised. The reason, marijuana.

Two young men in a Volkswagen were headed east on the freeway and, as the passenger reported, "higher than a kite." It was later reported that the passenger in the Volkswagen jerked the steering wheel out of the hands of the driver, "because they were not going fast enough." Their speed was estimated in excess of 60 mph in a controlled speed zone. Result, they missed a curve, lost control. As their car hit the median it turned on its side and slid onto the westbound lanes of the freeway, directly into the left front wheel of her car. The driver of the Volkswagen received a few bruises and was out of the hospital by the following Thursday. His passenger received a broken leg and was out of the hospital in two weeks.

My question is: How many users, growers, promoters, and law makers who seek to legalize the use of marijuana would be willing to pay this price?

Mrs. Anthony Chiappetta
1920 50th Street
Kenosha, WI 53140

SAFETY HAZARD

I have always enjoyed reading your magazine. In your Mar '78 issue I noticed that you had an article on auto maintenance with pictures of a young lady performing the maintenance (pages 9 through 13) with rings on.

I feel that some sort of a warning should have been printed with the article about doing this type of work with jewelry on. This is a safety hazard and could cause severe burns especially when working around or with the battery of a car.

Thank you for a good magazine.

TSgt Francis E. Horky, NEANG
155 CEF, Nebraska ANG
Lincoln MAP (ANG) Lincoln, NE 68524

You are so right! We have always stressed not wearing rings, watches, braclets, chains, etc., when working on a car. Of course, the engine was not running for these routine checks.

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

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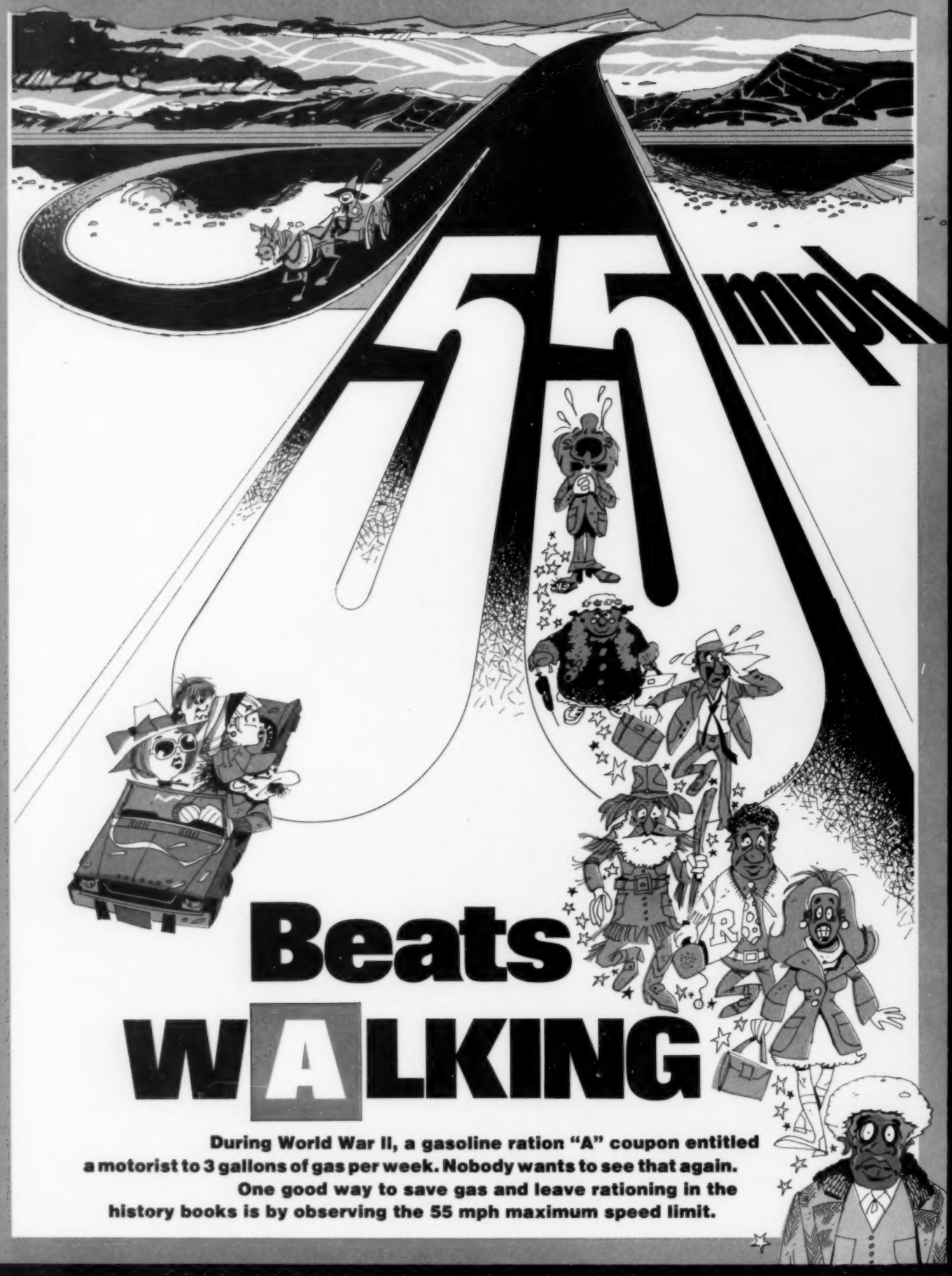
55 mph
Beats
WALKING
During World War II, a gasoline ration "A" coupon entitled a motorist to 3 gallons of gas per week. Nobody wants to see that again.
One good way to save gas and leave rationing in the history books is by observing the 55 mph maximum speed limit.